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Doctrine of Applied Doctrine

LIEUTENANT COLONEL SNYDER L. PEBBLES, *Infantry*
Instructor, Command and General Staff School

FINAL destruction of the Axis forces in Tunisia was not an easy victory over an already defeated enemy. It was the result of a well conceived tactical plan, superior leadership, and the efficient execution of plans by courageous, battle-experienced troops, air and ground.

Our II Corps played not only an important role but, as the battle developed, its role also became decisive in that the breakthrough effected by the Corps was the beginning of the end for the Axis.

Study of Lieutenant General Omar Bradley's report on the operations of II Corps during the period 23 April—9 May 1943 leads one to the conclusion that our tactical doctrine is sound; that when doctrine is applied by higher command in planning and when plans are vigorously carried out, victory will result. *The remainder of this article will consist of extracts from II Corps report, with quotations from FM 100-5 and FM 100-15 to substantiate the above conclusion.*

"At the time (13 April) instructions were being issued for the final assault against forces in Tunisia, the II Corps was completing a previous operation in southern Tunisia. To concentrate the Corps in northern Tunisia necessitated moving almost 100,000 men and equipment an average distance of some 150 miles. It was obvious from the start that, inasmuch as the date for the final assault had been tentatively set for 22 April, only the 1st and 9th Infantry Divisions with the necessary Corps supporting troops could be concentrated for the initial phase of the attack. These troops were therefore given first priority for movement, with 1st Armored and 34th Infantry Divisions being moved last.

"Movement of the Corps was completed on schedule and without incident. It was found that moving this number of troops and equipment over roads which normally handled considerable traffic necessitated an increase in the time length of columns. The average number of vehicles per hour which could be expected to clear a point within a 24-hour period was found to be 100.

"The 1st Inf. Div. began relief of 78th Div. [British] on 16th April. [The 9th Division had already moved to positions on the north flank, from Dj. Gremil to the coast.—Ed.]

"1st Arm. Div. began arriving in Beja Area 22 April. 34th Div. followed 1st Arm. Div. into area with first elements arriving 23 April."

FM 100-15, par. 87: *It is essential that the offensive forces have air superiority and that this air superiority is maintained throughout the*

operation. . . . It may prove decisive in gaining surprise over the enemy.

Comment: Air superiority was obtained and maintained so effectively that it is believed the movement of II Corps was not known to the Axis until it had been completed. While operations of the Tactical Air Force contributed to the success of the campaign in many other ways, screening the concentration of II Corps from hostile observation was the most valuable support of ground forces.

FM 100-5, par. 339: *The ability of a command to achieve results on the battlefield depends in large measure upon the marching capacity of the troops. . . .*

Comment: In view of the quoted report above, any comment here would be redundant.

PLAN OF 18TH ARMY GROUP

"Eighth Army

"To draw forces off First Army by exerting continuous pressure on the enemy.

"By an advance on the axis Enfidaville—Hamamet—Tunis, prevent the enemy withdrawing into the Cap Bon Peninsula.

"First Army

"Capture Tunis.

"Cooperate with II U.S. Corps in capture of Bizerta.

"Be prepared to cooperate with Eighth Army should enemy withdraw to Cap Bon Peninsula.

"II U.S. Corps

"Secure suitable positions for the attack on Bizerta, covering the left flank of First Army.

"Advance and capture Bizerta, with the cooperation of First Army on right flank.

"Preparations for attack to be completed by midday, 22 April.

"Command. II U.S. Corps to remain under 18th Army Group, but for these operations the action of II U.S. Corps to be coordinated by First Army who will issue the necessary orders and instructions direct.

"Full resources of Tactical Air Forces available to assist land operations."

FM 100-15, par. 92: *Full advantage must be taken of all means to deceive the opposing commander. With plentiful lateral routes of communication and modern means of combat and transportation it may, under certain conditions, be feasible to build up a strong force in one area [Eighth Army]; attack with a part of this force, follow this attack with the secret movement of*

MILITARY REVIEW

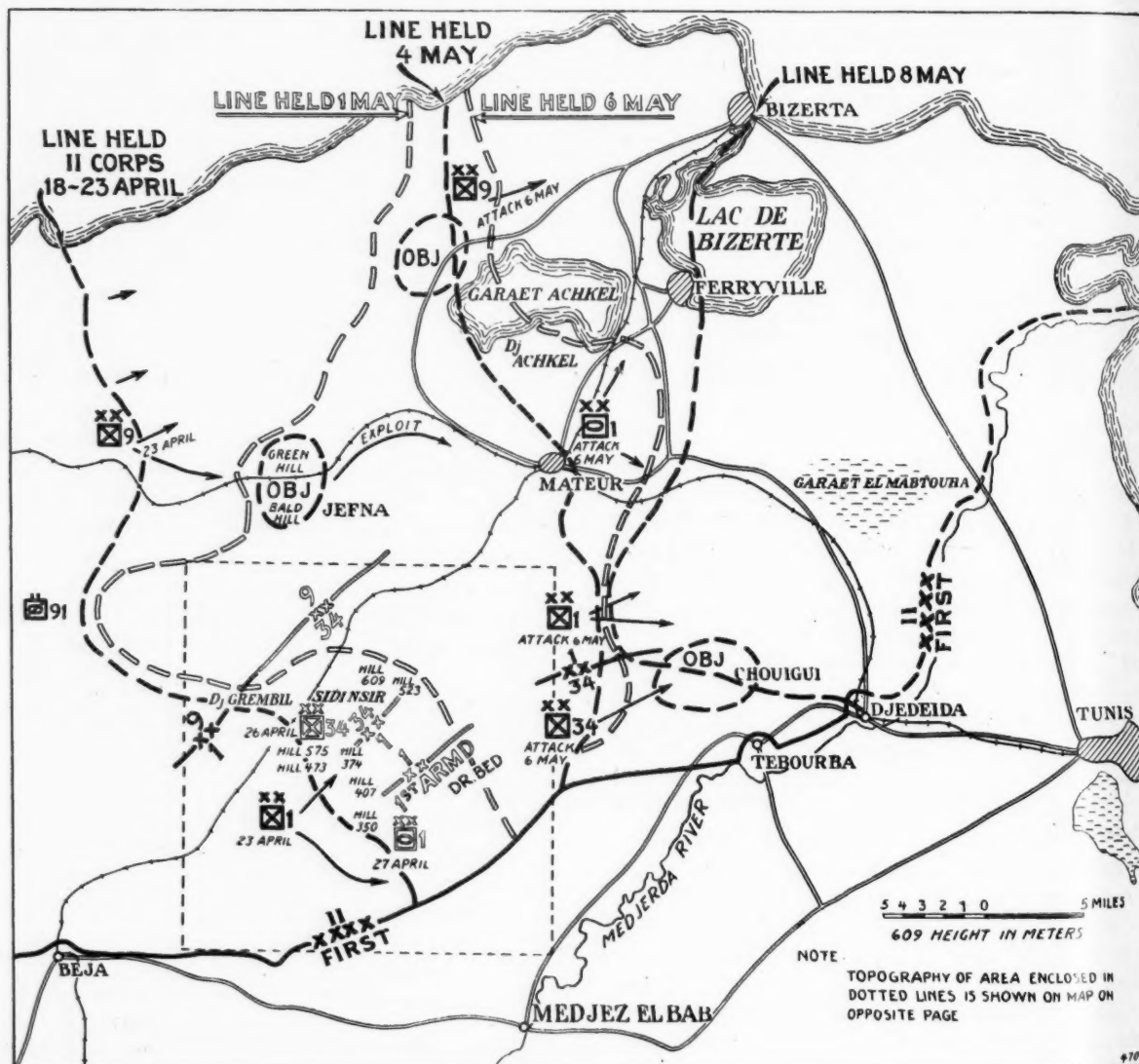
the mass of the assembled force to the area where the decisive effort is to be made, and strike in that area. . . .

Comment: Plentiful routes were not available, but all the above was done. For emphasis, repeat that deception could not have been successful without air superiority.

All reports on enemy dispositions indicate that the Axis expected the British Eighth Army to make the decisive effort and began shifting forces only after

fense, and therefore constituted somewhat of a death trap, the 1st Inf. Div. was ordered to attack north and south of this valley with its main effort on the north side to secure the dominating terrain east of Sidi Nsir. Likewise, in the northern sector the 9th Inf. Div. was ordered to contain the Jefna (Bald Hill and Green Hill) position and outflank it from the north."

FM 100-5, par. 194: . . . Military intelligence is thus an essential factor in the estimate



the operation was well under way. It is perhaps a safe guess to say that the Axis high command stubbornly held to its deduction as to the Allied intentions until the defeat was inevitable.

PLAN OF II CORPS

"Plan of Attack. II Corps was ordered to make its main effort on the right. There was considerable temptation to attack up the Dr. Bed Valley, but inasmuch as all intelligence reports indicated that this position was heavily mined, well-organized for de-

of the situation and in the conduct of subsequent operations.

FM 100-5, par. 134: While the mission of the whole force is the basic factor in the commander's estimate, this may frequently be resolved into terms of terrain. . . . in the offense, success may hinge on the capture of . . . features which then become the immediate objective of the attack.

FM 100-15, par. 30: Decisive action results

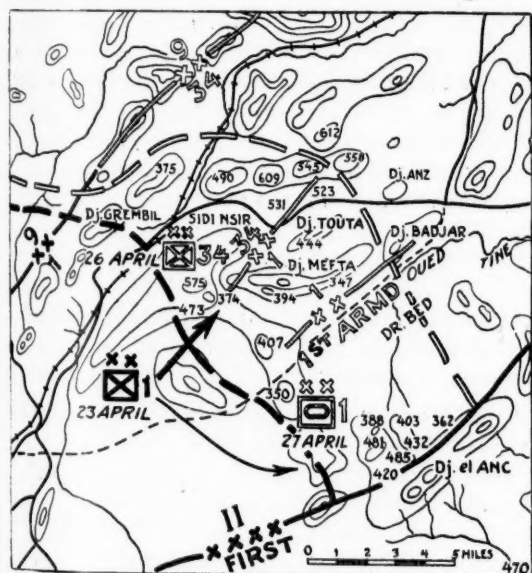
DOCTRINE OF APPLIED DOCTRINE

from clear cut, comprehensive plans based on a full realization of all available strength and means. . . . By surprise, by skilful use of the terrain, and by concentration of the power of all arms at decisive points the commander should plan to secure and retain the initiative.

FM 100-5, par. 451: The purpose of offensive action is the destruction of the hostile armed forces. To facilitate the accomplishment of this purpose the commander selects a physical objective such as a body of troops, dominating terrain, a center of lines of communication, or other vital area in the hostile rear for his attack. . . . This objective should have the following characteristics:

a. Its capture must be possible within the time and space limits imposed by the assigned mission.

b. Its capture should assure the destruction of the enemy in his position, or the threat of its



capture should compel the enemy to evacuate his position.

c. It should produce a convergence of effort.

d. It must be easily identified.

e. Its capture should facilitate contemplated future operations.

FM 100-5, par. 468: In a penetration the main attack . . . is directed on an objective in his rear. It is characterized by the complete rupture of the enemy dispositions; the seizure of the objective by operations through the gap; and the envelopment of one or both flanks created by the break-through.

Comment: It is apparent that there was a clear cut, comprehensive plan. Many other paragraphs from Field Service Regulations could be quoted enunciating principles which must have governed formulation of the plan of attack, which is stated simply in the brief paragraph of the report.

It is believed that the initial operation can be classed as a penetration. Selection of the high ground as an avenue of approach into the enemy position and avoidance of the valley will remind many recent students of the Command and General Staff School of the Tactical Ride in which Pilot Knob Ridge was used as an avenue of approach into the enemy position to the amazement of many students, because the utilization of valleys as avenues has become a fixed habit in the minds of too many officers.

CONDUCT OF THE ATTACK

"23rd April

"1st Inf. Div.: 18th Inf. with 1st Bn., — Armd. Regt. attached, attacked Hill 350 and Hill 407 taking 50 prisoners from T-3 Marsch Bn. on Hill 350. 10 light and 2 medium tanks were knocked out. Enemy launched counterattack from Hill 407. 16th Inf. captured Hill 473 and went on to attack Hill 374. 26th Inf. less 3rd Bn. attacked Hill 575 and met heavy resistance. 3rd Bn., 26th Inf. relieved on Dj. Grembil by 1st Bn., — Inf. (34th Div.) which took over mission of protecting left flank 1st Inf. Div. 6th Armd. Inf. [of the 1st Armored Division.—Ed.] made slight advance on south side of Dr. Bed Valley against stiff opposition."

Comment: The enemy resistance was determined.

"25th April

"1st Inf. Div.: Attacked at 0200 hours and captured Hill 575 and completed mopping up Hill 350."

FM 100-5, par. 859: Night attacks are made . . . to avoid heavy losses which would be incurred by attacks in daylight over open terrain. . . .

FM 100-5, par. 863: . . . Night attacks are the manifestation of an aggressive leadership, which is determined to bring about a conclusion without delay.

FM 100-5, par. 864: . . . An attack during the last hours of darkness may be advantageous as a preliminary operation to a general attack at daybreak because it gives the defender no time to organize.

Comment: Several months of combat were required to convince our commanders of the soundness of night attacks and the difficulty of successful execution of such attacks. It is the writer's opinion that this was not taught prior to combat, during the training period, because of the obstacles presented in umpiring a night exercise. However, the doctrine was there all the time, waiting to be applied.

"26th April

"It was evident by this time that it would be dangerous for the 1st Inf. Div. to advance further until the high ground on its left had been taken. During the attack on the 25th of April the Division had captured all objectives assigned it by Corps. The 34th Div. which was moving into the Beja Area

was given a zone on the left of the 1st Inf. Div. and ordered to attack and capture the high ground in the vicinity of Sidi Nsir. The zone to the south of the Dr. Bed Valley which had been held by the 6th Armd. Inf., under 1st Inf. Div., was turned over to 1st Armd. Div. The 9th Inf. Div. consolidated gains previously made."

FM 100-5, par. 483: *The commander is responsible for coordination of the action of all elements of his command.*

FM 100-5, par. 495: *Unity of effort is promoted by assigning subordinate units objectives which insure mutual support and prescribing where and in what direction subordinate units are to make their main effort. . . . The commander must endeavor constantly to prevent the attack from breaking up into a series of uncoordinated combats.*

FM 100-5, par. 476: . . . *The primary mission of the reserve is to enter the action offensively at the proper place and moment to climax the victory.*

FM 100-5, par. 482: *Choosing the proper time at which the reserve should be used is often the commander's most difficult and most important decision.*

Comment: The quality of leadership of II Corps becomes more apparent.

"26th April

"34th Inf. Div.: Strong enemy resistance encountered from Hill 609. One Bn. of the — Inf. advanced to base of Hill, but were forced to withdraw after receiving heavy shell fire. Later in afternoon same Bn. advanced and at last light [dusk.—Ed.] occupied Arab village at base of Hill.

"1st Inf. Div.: One company medium tanks was attached to the Div. The 16th Inf. captured Hill 523 by bayonet charge and assisted 34th Div. in repulsing enemy counterattack.

"30th April

"34th Div.: — Inf., supported by one company medium tanks, assaulted and captured northern slopes of Hill 609. Remainder of Hill was later assaulted and captured. A strong enemy counterattack was repulsed. Fighting all day was intense and bloody. The enemy was engaged with bayonet and grenade, and there were many cases of outstanding bravery. A considerable number of prisoners were taken."

FM 100-5, par. 26: *No one arm wins battles. The combined action of all arms and services is essential to success. . . . The higher commander coordinates and directs the action of all, exploiting their powers to attain the ends sought.*

FM 100-5, par. 125: *Attachments may be necessary when better support or coordination can be effected.*

Comment: Our troops were fighting and defeating a highly trained, skilfully led enemy. Our FSR do not emphasize sufficiently that once an objective is taken, immediate plans must be made to hold it against counterattack. Our units learned this lesson the hard way. It could have been learned during training.

THE BREAKTHROUGH

"3rd May

"By this time, the capture of Hill 609 and other dominating terrain in the vicinity of Sidi Nsir had forced the enemy to make a general withdrawal in front of the 1st and 34th Infantry Divisions. The 34th Division was ordered to relieve the 6th Armored Infantry on the south of the Dr. Bed Valley with one Inf. Bn. and the 1st Armored Division was ordered to move through the Dr. Bed Valley and occupy Mateur. Major General Harmon, Commanding General, 1st Armored Division, by instant and aggressive action pushed reconnaissance elements into Mateur and quickly followed this up with combat elements of his Division. By his aggressive action he undoubtedly caused serious interference with enemy's plan of withdrawal, and was able to occupy Mateur before defensive positions between Mateur and Ferryville could be completely organized. The enemy succeeded in blowing all bridges in the vicinity of Mateur. Likewise, in the north, the flanking action of the — and — Infantry had progressed sufficiently to cause the enemy to abandon the Jefna position (Bald Hill and Green Hill), and retire to the east. Instructions were issued to the Commanding General, 9th Infantry Division, to concentrate his attack north of Garaet Achkel and push on to Bizerta."

FM 100-5, par. 559: *In case of a breakthrough, armored units penetrate deeply into the hostile position and attack the enemy's reserves, artillery, and command and signal communication centers. . . . Other mobile forces are sent through the gap to exploit the advantage gained and to attack the enemy in rear and prevent his escape. . . .*

FM 100-15, par. 86: *Whether the breakthrough operations are initiated by infantry divisions or by task forces of large armored elements reinforced by combat aviation, . . . the breakthrough must be exploited by highly mobile, hard striking forces.*

Comment: The breakthrough of the 1st Armored Division was not exploited by other highly mobile forces, because they were not available to the Corps Commander. One motorized Infantry Division might have been the means of hastening the end of enemy resistance by four or five days.

"Situation II Corps, 4 May

"The enemy's reaction to our occupation of Mateur was immediate. Heavy bombing raids were launched

against our forward troops, and the bridges in the vicinity of Mateur which had been completed prior to daylight were bombed all day. The 1st Armored Division pushed reconnaissance east and northeast of Mateur to a distance of three miles, and met determined resistance. The 9th Infantry Division began concentration of — and — Infantry Regiments in the north of its zone preparatory to an attack on Bizerta."

PURSUIT

"During 8 May

"34th Division occupied Chouigui and pushed patrols to Tebourba, Djedeida, and north of Djedeida. On the same date, the 9th Infantry Division continued to clean up Bizerta and the 1st Armored Division, pushing aggressively east of Ferryville, reached J8293 [east of Lac de Bizerte.—Ed.]. The — CT was attached to the 1st Armored Division to continue the attack east of Ferryville. C. G., 1st Armored Division, ordered to push aggressively and to expend tanks freely, if necessary, to effect complete destruction of enemy. Barentine Regiment withdrew from in front of 1st Infantry Division. 3rd Infantry Division [not available when operation began.—Ed.] was ordered to pass through 1st Armored Division night of 9-10 May and continue destruction of enemy. Over 4,000 prisoners of war had been taken by this date since the start of the operation. Late in the day, the enemy started destroying his equipment and it appeared that he was incapable of prolonged resistance. Right boundary of II Corps was extended along the Medjerda River, exclusive, to the sea."

FM 100-5, par. 579: *Effective pursuit requires leadership and exercise of initiative to the highest degree in all echelons of command. . . . Pursuit of a defeated enemy is pushed to the utmost limit of endurance of troops, animals, and vehicles. No opportunity is given him to reorganize his forces and reconstitute his defense.*

FM 100-5, par. 1135: *In exploiting a breakthrough the armored division is effectively employed to operate at great distance in the hostile rear areas to block routes of hostile movement, to attack strategic reserves and to seize vital areas. . . .*

Comment: It is believed that this employment of the 1st Armored Division in the breakthrough and exploitation was the first time our armored forces had been utilized in mass and in proper role in combat. At this particular point in the operation, ele-

ments of II Corps were particularly vulnerable to air attack and counterattack, but the Tactical Air Force continued to maintain air superiority and bombed enemy movements in rear areas.

THE END

"9 May

"At approximately 1100 hours, two German staff officers reported at the CP, 1st Armored Division, and requested an armistice to negotiate terms of surrender. The request was referred to Headquarters II Corps and instructions were issued to the C.G., 1st Armored Division, to inform the German Commander that terms were unconditional surrender. Furthermore, that he must accept these terms without delay, and that all destruction of property must cease immediately. The German Commander, Maj. Gen. Krause, was notified at 1140 hours and by 1200 hours had accepted these terms and all organized resistance in northern Tunisia in front of II Corps came to an end. Mopping up continued and some fighting on Dj. Achkel went on until 10 May, but all serious resistance had been ended."

LEADERSHIP

FM 100-5, par. 120: *Decision as to a specific course of action is the responsibility of the commander alone. . . . He alone is responsible for what his unit does or fails to do.*

FM 100-5, par. 103: *Troops are strongly influenced by the example and conduct of their leaders. A leader must have superior knowledge, will power, self-confidence, initiative, and disregard of self. . . . Mutual confidence between the leader and his men is the surest basis of discipline. . . .*

Comment: If one word in the last paragraph can be selected as more important than another, or the one most applicable to the leadership of the II Corps, it is probably "confidence." It is believed that superior professional knowledge, initiative, and masterful direction of forces were merely the means to inspire the essential confidence. Had command possessed every quality of leadership but by some quirk of personality failed to obtain the confidence of subordinates, the success of the Corps might not have been so decisive.

Confidence of troops can be developed by the example and conduct of the leaders, says our FSR. The leadership exhibited may then be called another case of applied doctrine.

The moral guilt of a bad instructor will be measured by the corpses of his comrades on the battlefield.

—Captain Sean Feehan in *An Cosantóir*

The Tactical Air Force

WING COMMANDER M. T. JUDD, RAF
Instructor, Command and General Staff School

SINCE THE birth of aviation there have been arguments between military men as to how an air force can best support the ground effort in war. Now, after four years of World War II, it has become generally agreed that the answer lies in the organization known as the Tactical Air Force.

The TAF is no sudden invention. It has devolved from the experiences of the RAF and the Eighth Army in their constant effort to improve their technique as a combined force. When allied forces invaded Algiers and advanced on Tunisia, they found that their air forces were not organized to give the forward troops either the protection or the support that they required. The system was revised to embody all the lessons learnt in the western desert; but since both the combat area and the forces were larger, a more elaborate organization had to be produced than in the original model.

There were three fundamental points in the philosophy of air power as used on the western desert; these were flexibility, centralized control, and the close association of Army and Air Force Hq and staffs.

General Montgomery has written:

"The greatest asset of air power is its flexibility, and this enables it to be switched quickly from one objective to another in a theater of operations. So long as this is realized then the *whole weight* of the available air power can be used in selected areas in turn; this concentrated use of the air striking force is a battle-winning factor of the first importance.

"It follows that the control of the available air power must be centralized, and command must be exercised through RAF channels.

"Nothing could be more fatal to successful results than to dissipate the air resources into small packets placed under the command of army formation commanders, with each packet working on its own plan. The soldier must not expect, or wish, to exercise direct command over air striking forces . . .

". . . All that is required is that the two staffs, army and air, should work together at the same Hq in complete harmony, and with complete mutual understanding and confidence."

This statement carries with it all the authority of a successful army commander, but still many military men criticize the point of view here expressed. They argue that the ground commander must be in a position to enforce his demands on the air force, if necessary by giving a direct order. Thus the air commander would be in a subordinate position—more like an artillery commander. Failing that, they

say there must be someone immediately superior who can be appealed to if a decision on the use of air cannot be arrived at. It is said that in the western desert the only court of appeal was the Prime Minister in London, and that such a position was ridiculous; the appointment of General Eisenhower as Commander in Chief was supposed to solve this difficulty. Now there is no record of either the Prime Minister or General Eisenhower having been called upon in such a case. As a result of the perfect understanding of one another's problems a compromise was always reached in the field. It was not an exceptional case when Montgomery and Coningham showed that they had well-adjusted temperaments. Before Montgomery, Coningham had cooperated with Auchinleck; after Coningham left, Montgomery cooperated with Broadhurst, Cross with Anderson, Coningham with Alexander, and so on. Commanders must be able to coordinate and work together under such a system, but this is not an objection. It merely emphasizes a quality required of all commanders—that of being able to cooperate with commanders of other arms.

The alternative is unsatisfactory. The prime mission of an air force is to destroy the opposing air force, or at least to attain air superiority over the battlefield. This is an airman's battle, and the ground force commander is no more competent to direct it than the airman is to command the ground forces.

When Kesselring and Rommel disagreed, the decision was Rommel's. Perhaps it was because of this that the German air force in North Africa never achieved the success which its numbers and equipment merited. Instead it was frittered away in penny packets, never having sufficient forces available for counter air-force operations to achieve a favorable decision.

There are few today who will disagree with the doctrines of flexibility and centralization of control. Clearly the effectiveness of an air force in a theater where hundreds of thousands of men with guns and armor are embroiled is not due to its potential destructive power; it is due to the fact that without shifting its operating base it can strike unpredictably in quick succession at many different points and achieve such an economy of force that its numbers have to be considered in quite a different light to those of tanks or infantrymen.

On the ground it is a well-established doctrine to concentrate forces at the decisive point for an attack; this applies equally to the air, and can only be carried out by centralizing control at army level and above.

Now the Western Desert affair, though in one of the decisive theaters of the war, was a small one. In Tunisia coordination was needed at Army Group Hq and at allied GHQ. The air formation associated with a field army now became only one of three parallel institutions. These were grouped under Hq Tactical Air Force whose logical opposite number was Hq 18th Army Group. The two Hq shared the same camp and the staffs (mixed British and American of both arms) associated very closely in their planning.

The role of Hq TAF was operational coordination of air operations in support of the armies in the field by formulating policy, planning, and the issue of guidance by means of directives to lower formations. The commander was concerned particularly with the reinforcement of one group by another and with his operations of the Tactical Bomber Force which he kept under his control. Normally the lower formations were allowed to do their own detailed planning, but in any case where the AOC TAF (Air Officer Commanding Tactical Air Force) considered that aircraft of the TAF were not being best used he would not hesitate to step in and correct this.

The only administrative matters dealt with at this Hq were those which affected operations, and those personal matters which were of particular concern to Air Marshal Coningham.

This administrative control was exercised by Hq North African Air Force. This contained a mixed American and British staff and exercised administrative and supervised operational control over the various air forces and commands in northwest Africa. It was the only Hq in the chain of command which did not have a complementary army formation; this lack was, however, somewhat made up for by the visits paid to this Hq by General Alexander and Air Marshal Tedder.

This, then, was the first tactical air force designed to meet the needs of a heterogeneous army group in northwest Africa. We would expect to find some organizational changes in the north European theater.

When the main allied armies come to grips with the enemy in Europe, we are likely to see a tactical situation involving at least two allied army groups, and large air forces concentrated in an area which will seem very small to veterans of El Alamein and Tunis. The air fighting will not only be heavier, but the "big league" will be performing. If our air force is to win that essential air superiority, and maintain it after the amphibious operation, our air fighting technique must be first class.

We have heard about the formation of British and American Tactical Air Forces in England. These are already in existence and their component parts are at various stages of readiness. Essentially they are based on the African model. The American army-level formation is called the Tactical Air Division while the RAF version is called the Composite Group.

A Composite Group includes some very interesting and ingenious features. As in Africa, it is designed to translate ground force needs into air action. If the request for air support originates at army level the army commander has the air commander on the spot to consult. If the request comes from division or corps, each has an air party (called an Air Support Tentacle) whose duty it is (besides passing intelligence and information forward and back) to send by radio the target request to Army/Air Hq. The request reaches A-3 and G-3 and, if approved, will be flown immediately.

Everything has been subordinated to achieve mobility. The Composite Group answers the question: "How soon after an airfield has been captured can our aircraft expect to be operating from it?"

With the trains of the leading division travel the reconnaissance party of an airfield construction group. As soon as the head of the division has passed the airfield, or site, this party prepares the way for the advance party which follows closely behind. Equipped with tractors, bulldozers, etc., and including sappers and a bomb disposal squad, they set about making a landing surface for aircraft. If the site is captured on Monday night, under normal conditions they will have it serviceable by Tuesday night. During Tuesday the remainder of the leading division should be past, and two more units have arrived at the airfield. One is a truck column (known as a Supply and Transport Column) which dumps aviation gasoline, lubricants, and oxygen at the site. As soon as it has dumped, it returns to Army RH (Railhead) and restocks preparatory to rejoining the leading division. Secondly, we have a Servicing Commando which travels (also in the tail of the leading division) with sufficient tools and airplane spares to service and maintain the squadrons until their main parties arrive. Thus, under good conditions, the field is cleared, stocked, and staffed within twenty-four hours of its capture. At any subsequent time the aircraft can fly in. At one time during the pursuit in Tripolitania, our Spitfires landed on a newly constructed landing ground which was still under fire from German 88's! They expressed the opinion that mobility had been carried a little too far!

More difficult is the problem of maintaining control and communications. A fighter force must not get ahead of its air-warning and fighter-control system; further it will be relatively ineffective unless the Composite Group commander can maintain close control over it in order to carry out his air support program. His Hq must move each time Army Hq moves, and this may be quite out of phase with the movements of the squadrons. In fact, heavy rain in the forward areas, making landing fields unserviceable, may separate him by 100 miles from his aircraft. It is largely for this reason that the Group Control Center (Tactical Control Center in the

USAAF) is disassociated from Hq and sites itself in geographical relation to the airfields which, whenever possible, are kept very close together. This control center moves in two operational halves which leap-frog one another and phase their movements with those of the squadrons. To maintain communications a large number of mobile signals units are used. Hq can always transmit its orders to the control center, and the latter, in executing them, has not only point-to-point radio communication with the airfields (in addition to ground/air) but is normally within easy reach for land lines or DR's (dispatch riders).

So far nothing has been said about reconnaissance—one of the most important air contributions to the ground force. Certain principles are clearly established.

Firstly, tactical reconnaissance aircraft must operate under the control of a fighter operations room and often with fighter escort.

Secondly, Tac R will be centralized under Army and the Tac R wing commander will live at Army/Air Hq in order to advise on the use of

Recce (Reconnaissance) aircraft. This does not change the principle of scattering squadrons so that each is as close as possible to the corps for which it will obtain information. This arrangement has been found to result in very close cooperation and an improvement in the quality of Recce work.

A certain number of photo-reconnaissance squadrons will be kept in the field for tactical photography under command of the composite group, and of course Air Force Hq will run its own reconnaissance in order to obtain information for higher formations such as strategic air force, tactical bomber force, etc. Most reconnaissance in the field will be pre-planned the night before by the BGS (Brigadier General Staff) and the wing commander, but any urgent requests by front line units can be sent through the same channels as target requests.

Very briefly, then, this is the TAF at its present stage. The British and American patterns vary hardly at all. Nearly all its details have withstood the test of trial in battle. Probably there will be further changes and improvements, but it should serve us well in the last stage of the European battle.

Armor for Airmen

[From an article by Lieutenant Robert V. Guelich in *Air Force* September 1943.]



FLAK suits for combat crews are protecting the lives of hundreds of Army Air Force men who have been flying through clouds of bursting anti-aircraft shells over heavily defended enemy positions.

Because fragments of exploding ack-ack shells too often have made it necessary to hospitalize much-needed crew members, special armored vests were developed in England. Now many of our crew members are wearing infantry helmets and flexible armor

suits from the neck to the hips, with a sporrán (apron) protecting the thighs. This armor has proved effective in repelling ack-ack and 20-mm shell fragments—protection that has greatly reduced the number of casualties in bombing missions.

The suits have proved so successful and acceptable to combat crews that British establishments are swamped with orders for them and American manufacturers have been called in on production contracts.

At the Armament and Equipment Laboratories of Wright Field, special steel and plastic suits of armor have been tested to determine what materials will offer maximum protection at a minimum weight. Types under study include riveted and cemented overlapping steel strips (approximately 2½ by 18 inches), overlapping two-inch squares of 20-gauge manganese steel, and solid breastplates. Canvas is sewed on both front and back of each section. The complete vest is hung on the shoulders and can be dropped off in an emergency by pulling one string.

The new armored vests are adapted to crew members according to the vulnerability of the positions which they occupy and according to location of armor-plate protection in the airplane. Because their backs are protected by the plane's armor, pilots and co-pilots need additional protection mostly in front. Other crew members wear complete armored suits that give them full protection.

Use of the 4.2-inch Chemical Mortar in the Invasion of Sicily

MAJOR WILLIAM S. HUTCHINSON, JR., *Chemical Warfare Service*

THE 4.2-inch chemical mortar was one of the many pieces of matériel that were first used in combat when the Allied Forces under the command of General H. Alexander invaded the island of Sicily on the morning of 10 July 1943. The purpose of this article is to relate how three companies of these mortars were used and what results were obtained thereby. The writer has personal knowledge of the majority of the action described and relies upon the testimony of reliable eye-witness officers for the rest.

The mortar used has a rifled bore of 4.2-inch diameter. The shell weighs approximately 25 pounds. It contains about 8½ pounds of high explosive or an equivalent weight of white phosphorus. Both types of shell were used for casualty effect against all types of targets. The maximum range at present is in excess of 3,000 yards. The mortar was employed in platoons of four to six guns using field artillery methods of laying and control. Fire direction centers were set up within the companies when the situation permitted, so that the fire of eight to twelve mortars could be placed on a single target within the overlapping zones of fire of the two platoons. Although this was not done because of the wide fronts assigned to the supported units and the limited traverse possible with this weapon, it is a capability of the battalion to mass the fires of all forty-eight mortars should such fire power be called for.

The battalion that was used was originally activated as a purely chemical weapons battalion whose normal mission is to support the operations of the other arms by the firing of screening and incendiary agents. With the development of a high-explosive shell for the 4.2-inch mortar, the high-explosive mission can now be added. The particular value of this weapon in a landing operation lies in its ability to deliver very heavy fire within its range and to be landed and put in action very early because of its weight, which is relatively light in contrast to that of field artillery pieces of equivalent fire power.

This account covers the actions of Companies A, B, and C only of a chemical battalion, which were part of the special Ranger force under the command of Lieutenant Colonel William O. Darby, and attached to the 1st United States Infantry Division. The mission of the force was to land at H-hour on the beach directly in front of the town of Gela, reduce the defenses thereof together with the coastal batteries that protected the approaches from the sea, and hold the town at all costs as a base for future operations. Gela, with its adjacent beaches, was very

highly organized to resist attacks from the sea. The defenses included pill boxes, barbed wire, coastal batteries, entrenchments, land mines, anti-personnel mines, booby traps, and tank traps. During the establishment of the initial beachhead and during the initial phases of the further operations on the island, Gela was used as the main supply point for the American Seventh Army.

The special Ranger force consisted of two Ranger battalions; a battalion of an engineer combat regiment; a battalion of an engineer shore regiment; and a chemical battalion less one company which, operating as a separate company, was attached to a combat team of the 1st United States Infantry Division. Lieutenant Colonel Kenneth A. Cunin, the Commanding Officer of the chemical battalion, operated as Executive Officer for the Ranger force as long as the force remained intact.

The mortar companies landed as the fifth wave. Each company was loaded with all its mortar and ammunition carts and other combat echelon equipment on one L.C.I.L. (Landing Craft Infantry, Large). The landing operation was complicated by the unexpected existence of a false beach. Company C's ship managed to force its way in to the true beach and drop its ramps in waist-deep water. With some difficulty this company got its carts onto the beach and went into position under the protection of the first group of houses, to fire on the coastal battery which was located on Capo Soprano, a piece of high ground projecting slightly out to sea some 1,400 yards away. However, by this time two Ranger companies were working down parallel to the coast to knock out these guns. The radio communication with the forward observers did not function because of damage to the radio equipment during the landing; therefore, these mortars did not fire on this target except for two rounds of white phosphorus fired at extreme range in the hopes that they would be picked up and adjusted by the forward elements. These were lost, however, and the batteries fell to the Rangers shortly after daylight without supporting mortar fire.

Company B's ship was unable to cross the false beach. The ship pulled out and came in again just south of Gela pier and several squads were able to make the shore just at daylight. At this time the shore battery opened up on the three L.C.I.L.'s which were also taken under fire by an Italian machine gun still in action on the beach. The company commander disembarked with his leading squads in order to get them into position as soon as possible. Meanwhile the L.C.I.L. had worked slightly back out to sea so that

the rest of the company had to be disembarked into small fishing boats and rowed ashore. One 75-mm shell hit the ship, wounding four men in the company and killing one sailor. The remainder of the company landed and went into its assigned position without incurring additional casualties.

Company A's landing was the most difficult of all. The ramps were lowered in about one and a half feet of water directly on the false beach, evidently under the impression that this was the true beach. The troops began to disembark and four carts were sunk in six to seven feet of water before the truth was realized. These squads were instructed to abandon their carts and form on the other side of the beach awaiting instructions. To complicate the problem, the ship worked around broadside to the bar where she was grounded so severely that she could not come off to try for a better beaching. The company was ordered over the side to lighten the ship and form on the beach ready to come back aboard for the carts when a better beaching was made. An attempt was made to take the carts off in small fishing boats as Company B was doing but was unsuccessful because Company A's ship was too far out and the boats could not be handled in the strong surf breaking over the bar. The sunken carts were retrieved by using a long rope taken from the L.C.I.L. Finally the ship broke free and came back in a little more successfully. The troops came back aboard. One squad made its way ashore before the vessel worked back into deeper water entangling the ramps so that they could not be used. The artillery and small-arms fire ceased at this time and the remainder of the equipment was disembarked into an L.C.V.P. (Landing Craft Vehicular Personnel). Company A then went into its assigned position some three hours after daylight. During this debarkation, Company A's ship received three direct hits from the coastal battery of 75's which cost the company four men wounded.

The difficulty of landing has been taken up at some length because it is felt that this experience demonstrates that L.C.I.L's are not suitable landing craft for 4.2-inch chemical mortar companies when there is any possibility of the existence of a false beach. L.C.A's (Landing Craft Assault) or L.C.V.P's would be more practical because of their more shallow draft. This proved to be the case in the landing of Company D with a combat team farther to the east.

The first counterattack on Gela was repulsed before Company A or B got into position. Company C's observer called for fire of one platoon on a tank and infantry attack coming from the Ponte Olivo Airport. The infantry was stopped with casualties and retired in disorder. The tank attack was stopped and forced to withdraw. Communications were cut and before the lines could be repaired a second tank attack broke through, but communications were restored and a third attack by a second group of tanks was

stopped. One platoon from Company B was also able to fire on these tanks as they approached the town. These mortars reinforced the fires of Company C with the results described above.

The nine light Italian tanks that broke through the mortar fire (referred to above) were handled very aggressively by the Italians since they evidently felt that we had had little opportunity to bring antitank weapons ashore and their attack could cause us much damage and might possibly drive us into the sea. They ran straight up into town. Fortunately, one 37-mm gun and several bazookas were available. The antitank gun got one. A bazooka team from Company A of the chemical battalion stopped another which was then blown up by the Rangers with a pole charge. Another pole charge dropped from a building got another tank. The rest withdrew.

A perimeter defense of the town was set up by the two Ranger battalions and the battalion of combat engineers, with one of our mortar companies in direct support of each. Throughout the day the mortars fired on miscellaneous targets of opportunity. Company B knocked out two medium German tanks with high-explosive shell. The zones of fire of the mortars were arranged to extend continuously from the coast on the west flank of the town inland with Gela as the center and back again to the coast on the east flank of town. No enemy could approach the town without coming into the mortar fire.

On the evening of D-day, Company C was attached to another combat team of the 1st United States Infantry Division to support its attack on the Ponte Olivo Airport. At daylight on D + 1, this force was in position on high ground just short of its objective. Company C was ready to fire with its forward observer in position in a fox-hole just in front of the outpost line. As visibility became clear, the Germans launched their counterattack. They came directly against our position crossing a sloping valley to approach our lines. The observer called for continuous fire on the valley. Over it came both high explosives and white phosphorous. German losses were very severe but nevertheless they pressed the attack. Our mortars ran out of ammunition. Some of the Germans reached our lines and forced our infantry to withdraw. The observer's fox-hole was also occupied by a machine gunner from our infantry. He had held his fire on the observer's order to avoid calling attention to the observation post. When the enemy broke through, he opened fire and cleared the hill. It was later learned that the infantry had been forced to withdraw by a Mark VI Tank attack on the other flank. The observer now returned to the company position. One platoon had already retired to a firing position on the eastern outskirts of Gela to cover the withdrawal, and that afternoon the remainder of the company joined this platoon.

One platoon of Company C was now in a firing position in Gela covering the road to the Ponte Olivo

Airport about 1030 on D + 1. Three mortars were firing from the railroad into tanks in the field. The antitank guns covering the road from the southeast parallel to the coast opened up on nine Mark IV Tanks. These Germans halted near the road, well out of effective antitank range. Two of our 4.2's were set up on the shoulders of the coastal road. An officer climbed into the tower of a brewery located at the cross road, voice relay was arranged, and fire was opened with high explosive and white phosphorus. Because of the sketchy emplacement without digging in or putting out aiming stakes, the gunnery was very bad. No tanks were hit, but the Germans apparently did not desire to run through the white phosphorous and high explosive screen. They pulled back about two thousand yards, and the officers observing had the satisfaction of seeing all nine knocked out by artillery and naval gunfire.

Earlier that morning one platoon of Company B fired on what was evidently an Italian reconnaissance patrol of fifteen men approaching Gela from the north. The fire chased the Italians from one draw to another and then to a haystack where one volley fell directly in their midst. The wickedness of this mortar's high explosive shell was, therewith, duly proved. No further movement was observed.

In the afternoon Company B shared honors with the guns of a warship in repulsing a battalion of Italian infantry attacking the town from the north. They were approaching down a shallow draw that crosses the long, flat plain behind the town when they came under observation. Fire with high explosive was opened with deadly effect. Caught in the open, the Italians had no protection. The survivors who did not break took cover in the lee of the high railroad right-of-way to which, for some inexplicable reason, the fire was not shifted. The fire was lifted and two medium tanks and two half-tracks were then sent out to round up this remaining element. Prisoners taken numbered over four hundred.

At about 2300 on D + 1, Company A was ordered to move out to support an attack on the Italian strongpoint northwest of Gela in the vicinity of Mount della Lapa. The attacking force consisted of three companies of Rangers, a company of half-tracks from the combat engineers, two companies of armored infantry, Company A of the chemical battalion, and five medium tanks from the 2nd Armored Division available for use after daylight. Company A was completely motorized in four 2½-ton trucks and three peeps. As day broke on D + 2, the company had just reached its firing position in very shallow defilade immediately south of the strongpoint where the road first bends toward the west after running straight northwest from Gela. The mortars were being laid and the personnel at the observation post were digging in.

The objective for the Ranger companies was the mountain to the east of the pass directly behind the

strongpoint, Mount del Zai. By daylight the Rangers had reached their objective but the Italians continued to hold the strongpoint.

The objective for the armored infantry companies was Mount della Lapa. It was unoccupied. The infantry had not been able to jump off before daylight. There was a long stretch of flat ground to cross to the foot of the mountains, a perfect field of fire for the automatic weapons in the strongpoint, so the attack was held up until the mortars, the half-tracks, the five medium tanks which could be used after daylight, and the warship got an opportunity for some preparatory fire.

The mortars opened up first. The wire, trenches, and pill boxes of the enemy positions were plainly visible from our observation point, but we were afraid that there were still some Rangers left in that area. Things had moved so fast with the Rangers that the mortars were out of radio range with their forward observer. When contact was gained with the Ranger companies, it was found that several Ranger squads had been pinned by machine-gun fire and were still held in the strongpoint area to the right flank; otherwise we could now have subjected the entire strongpoint to a very heavy fire. It was known that the left flank of the enemy position and Mount della Lapa were unoccupied by our troops because the armored infantry was still deployed in defilade on our left, so fire was concentrated on this area.

Shortly after fire was opened, the Italians hit the mortar position with their artillery. Company A took what must have been a battalion concentration of 75's with only one casualty. The value of deep slit trenches cannot be over-emphasized. Three duds landed in that concentration, two right among the mortars, and one next to the ammunition.

As soon as the artillery lifted, we resumed fire. The Italians then began searching the whole valley, evidently in an effort to ferret out the mortar position and smash it. Except for interdictory fire, the artillery hit the mortar position with equal force only once more that day but no further casualties resulted.

Under cover of our fire, the trapped Ranger squads advanced to their objective. We now fired on the entire area, reducing one target after the other including a pill box that went out of action when a burst landed fifteen yards away. One platoon placed a smoke screen on the ridge directly behind the pass to our direct front. We were sure that this was their artillery observation post. Their artillery was much less effective thereafter.

About 0800, five of our medium tanks ran through the enemy position shooting up everything they could find. They pulled back behind the hill on which our observation post was located and the fire fight continued.

Near midday the tanks went out again with the engineer half-tracks, and this time the Italians had had enough. They surrendered in droves. The tanks

then pulled up just short of the crest of Mount della Lapa, hull down, and covered the advance of the armored infantry to its objective.

About 1000, the warship opened on the Italian artillery which was in position some 4,000 yards behind the strongpoint beyond the second ridge. A Ranger officer furnished the observation from Mount del Zai. Italian batteries were knocked out one by one until the enemy artillery fire ceased about 1730.

The mortars of the 2nd platoon of Company A moved out behind the armored infantry and took up a position to support the defense of Mount della Lapa. The 1st platoon moved up after the 2nd was emplaced, and dug in to support the Rangers on Mount del Zai.

The force was thus entrenched in a very strong position which was held without serious opposition until after dark on the next day, which was D + 3. That night the remainder of the Ranger battalion pushed straight on through and took Butera. In the meantime the entire Ranger Force had been detached from the 1st United States Infantry Division and attached to the 2nd Armored Division. An armored field artillery battalion, boasting eighteen self-propelled 105-mm howitzers, had been added to our force. They

had registered on Butera and were prepared to shell the town. Company B of the chemical battalion had moved up from Gela prepared to go into position on call. Company A had moved up into position behind the ridge just beyond their last reported location prepared to fire on order. However, the Rangers were able to take the town in the face of stiff opposition without calling for fire. In this entire operation our casualties in all arms were very light which, it is believed, demonstrates most conclusively that troops properly trained to take maximum advantage of all cover and concealment, trained thoroughly in scouting and patrolling, and schooled always to move fast, will live to fight another day.

With the fall of Butera, the mission of the Ranger force had been accomplished. It was pinched out by the divisions advancing on either flank. The force was dissolved and the various units went their separate ways. It is felt that the 4.2-inch chemical mortar had demonstrated its effectiveness as a close support weapon in combat. The ability of this weapon to mix white phosphorus and high explosive in any desired proportion with deadly effect, both as to casualties and on enemy morale, makes it a two-pronged instrument of great value to assist the advance of the infantry in any type of situation.

A Battalion Hospital in Russia

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Spanish article by Captain V. J. Sanchez, Spanish Army Medical Corps, in *Ejercito* (Spain) June 1943. Captain Sanchez served with the Volunteer Spanish Division in Russia.]

DURING the winter, stabilized warfare and the necessity for maintaining in the hospitals the smallest possible number of soldiers as a precautionary measure against any emergencies that might arise, brought about the creation of battalion hospitals with a capacity of from a dozen to twenty beds. These hospitals were installed, when possible, in protected cellars in places where the front was close to some village, and when this was impossible, in shelters in the snow. Since there was a great abundance of medical supplies in the division, it was possible to fit out these hospitals perfectly.

The situation of our battalion, ideal for a hospital, permitted us to fit it out with the following conveniences:

1. A heated waiting room with a capacity for twenty wounded men.

2. A dressing room in which we set up wooden supports, seventy-five centimeters above the ground, on which the stretcher was placed for the purpose of dressing the wounds. For the illumination of this room we had at our disposal a carbide apparatus

which gave us a white light of great intensity. For the other parts of the establishment we had other carbide lights of lesser brightness, and coal-oil lamps.

3. A room for the beds, which in our infirmary was ultimately fitted out with twenty-seven beds of which ten were for sick men and the rest kept in reserve for the use of men after their wounds had been dressed and before they were evacuated, unless it was a case of great urgency.

4. A store room for material and a little room for the daily examination. (We are speaking of a battalion hospital with another advanced dressing station.)

5. In addition to these rooms there was a large room for gas cases which was never used. In this room we had, in addition to the ordinary equipment for this type of patient, an oxygen apparatus for five simultaneous treatments.

All the rooms were provided with at least one stove which was kept burning continually all through the winter.

A Modernized Concept of the Defensive

LIEUTENANT COLONEL JAY C. WHITEHAIR, *Cavalry*
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THERE are very few techniques in warfare which remain static or constant. Major doctrines may remain unchanged over long periods, but the details of their application may vary so completely that the staff officer, the "pick and shovel" man, may say that from his point of view the change is tremendous.

The gasoline engine, while it may not have altered our basic concepts of mobility and maneuverability, has certainly made amazing changes in the "time and space" factors with which a staff officer has to deal; these changes, noticeable as they are on the ground, become even more pronounced in the air.

We have adapted ourselves fairly quickly to the use of motors and the increased speed provided thereby, in calculating our own capabilities to move, assemble, attack, and exploit. This was made easier by the fact that while moving forward we retained the initiative. But we have not been quite as quick to vary our technique in coping with the situation when the other fellow has the initiative. There is a good logical reason for this: I cannot make a final and decisive plan to counter your blow until I know just where, with what force, and how you are going to deliver your blow.

Many studies were made of Japanese and especially German techniques in attack, prior to the war in the continuing process of evaluating our concept of defense. But it was not until their "hands were shown" on the actual battlefields of this war that we could get the definite answers to: How much? How fast? How deep? How wide? How long? With what?

In May 1940 we saw the breakthrough of the Maginot Line, a crushing, penetrating, ever-widening spearhead of power and speed. We watched the reports of the long columns thrusting far beyond the French positions and we said *then*, "these long, sinuous columns can't last; they'll be cut off." But they did "last"! And we *now* know we were witnessing the death of the linear system of defense.

And so the background of the change began.

Since that time each of the major nations has conducted profound studies based on the known methods of attack of its opponents and also based on any available information gained by its allies.

The discussion which follows is an indication of a trend along which many are working. Where possible, certain comparisons are drawn between this modernized concept and the existing techniques with which we are more familiar.

Why we defend.—As this subject is primarily in

the realm of "Command decisions" and as such does not need the attention that later points will, suffice it to say that defense alone cannot win a war. But it may be adopted by the Commander to

a. Gain time—for example, to build up reserves or supplies or to receive reinforcements.

b. Conserve power—for example, to release men to be used offensively on other fronts.

c. Bar the enemy from territory that has tactical, strategical, or political importance.

In a word, let us say that we will defend either on order of higher authority or on the decision of our own immediate commander.

This brings up the matter of *hasty* versus *deliberate* defense. In order to develop the thesis properly it is necessary to work out the basis of a complete, premeditated defense. So our discussion will be based on *deliberate* defense, knowing full well that the day may come when any of us may be faced with only the opportunity for *hasty* defense, in which case we will have to go as far as we can toward the ideal and fight from there.

Advantages of Defense.—Let us mark these well, for it is on our understanding of these advantages that our defense may stand or fall.

a. We can select the terrain on which we'll fight.

b. We can organize it to increase its value.

c. We can have complete knowledge of every advantage and disadvantage of the terrain itself, which the enemy may not have. This permits us to coordinate our fires in advance.

If we don't take full active advantage of these points, we throw away the only superiority we may have.

Disadvantage of Defense.—The tremendous disadvantage of defense is the loss of initiative.

The attacker is able to group all of his forces for a decisive action at one location, while the defender must be strong everywhere. So the defender must offset this advantage of the attacker by making his defense *deep* so that it cannot be destroyed in its entirety by the original onslaught of the enemy. The defender must also provide for *flexibility* so that he can concentrate as soon as possible on the center of gravity of the attacker. This requires mobility of all echelons. The defender must provide for *all-around* defense so that he can meet attack from any direction. The defender must be *aggressive*, otherwise he will be destroyed methodically, part by part. And above all, the defender must dig—fox holes, dugouts, emplacements—everything that can put man and matériel beneath the surface of the earth.

In all of the above matters there is common agreement. It is the technique of accomplishing them with which we are so vitally concerned.

Doctrine.—The doctrine of defense as laid down in our Field Service Regulations remains unchanged; it "contemplates the organization of a battle position to be held at all costs and the use of covering forces to delay and disorganize the advance of the enemy and to deceive him as to the true location of the battle position."

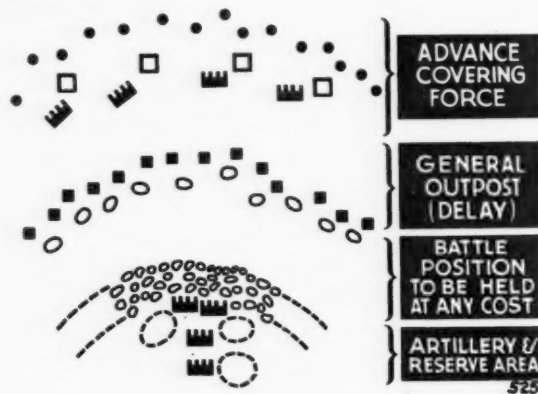


FIGURE 1.

The Covering Force (Figure 1).—As this is quite often the problem of the higher commander, and its actions comprise almost a separate operation, we will not say more than to comment that it is a mobile force with the mission of delay and deception operating at some distance to the front.

The General Outpost.—In order to give us some idea of the picture of the outpost, let's state that it may often be out three to five miles plus or minus, and then consider the reasons for this statement:

1. Its mission is to provide time for the defender to prepare for attack and to deceive the enemy as to our battle position.
2. It protects key observation areas, which has two effects: it permits us to look deep into enemy territory, and prevents the enemy from studying our own situation, and employing observed artillery fire.
3. It tries to force early development of the enemy attack in order to give us more time to parry the specific thrust of the enemy.
4. It should be protected by the forward echelon of our light artillery.

It may be necessary because of the terrain to push the outpost beyond support of emplaced artillery. In that case some artillery may have to be moved forward behind it, or perhaps it may be necessary to have the artillery of the withdrawing covering force drop off and support the general outpost.

The general outpost may come from either the general reserve or reserves from front-line regiments.

Combat Outposts.—We will not go into combat

outposts other than to say that they must be used for local protection in front of the individual units sending them out.

The Battle Area.—Let us first consider the terrain from the point of view of these five factors:

1. Observation
2. Fields of fire
3. Cover and concealment
4. Obstacles
5. Communications.

In studying terrain, we must consider these five factors in selecting any area for our battle position. All five will seldom be found to our advantage in the same degree; so we are faced with the problem of "weighing" them in any specific situation. General rules cannot be laid down, but we can point at certain definite considerations: If G-2 reports the enemy to be strong in armor, then obstacles become of tremendous importance. If the enemy is superior in the air, then cover and concealment certainly will receive extra weight. If the defense is expected to last for a long period then routes of communication must receive extra attention. If we are receiving additional artillery support from higher authority then artillery observation points become extremely important. These and a multitude of other considerations must be fitted into each specific situation.

The defense would like to pick a location for its action which has cross compartments across its front. Why?

1. Fields of fire and observation would be practically continuous across the front.
2. If the attacker should appear in strength at any one point, the fires of the entire front could be brought on him without changing observation posts.
3. It favors a system of crossed flanking fires.
4. The attacker must neutralize a relatively wide front.

The attacker would like to attack along a corridor. Why?

1. He would be protected from all flat trajectory weapons not within the corridor.
2. Observation for the defender's artillery would be limited by the confines of the corridor.
3. A much smaller amount of enemy fire need be neutralized to effect a penetration, specifically: the flat fires from within the boundaries of the corridor and the observation which directs the artillery from without.

The disturbing factor is that it's very seldom that the ground is ideal one way or the other, but instead comprises both cross compartments and corridors as shown in Figure 2.

Realizing this to be the case, we have always tried to set up our defense to take advantage of the cross compartments and to offset the disadvantage of the corridors. We gave our regiments and battalions fighting areas, the width of which were predicated

on the relative strength or weakness of the terrain involved. In other words a piece of terrain which had a good corridor (from the enemy viewpoint) leading into our position was allotted to a regiment

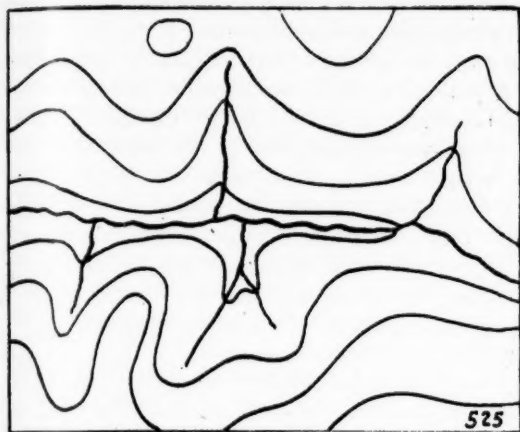


FIGURE 2.

with a relatively narrow front. While the adjacent regiment, with no strong avenues of approach, was given a wider front.

The Organization of the Ground.—In the past we have usually taken our tactical organizations as they exist and have fitted them to the ground, attempting to cover the entire front as shown in Figure 3.

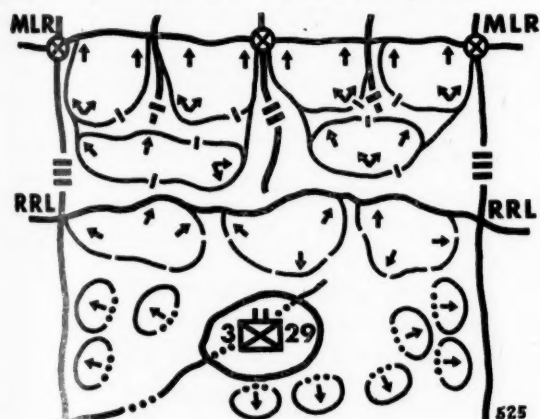


FIGURE 3.

Today's concept is different. We start not with our organization, but with the ground itself.

We study the ground first by means of maps and aerial photos and later by personal reconnaissance and decide on what the key defensive fighting areas are that must be held at all cost. We must not take this lightly; we must literally mean, "The key defense areas that must be held at all costs." We then make decisions as to how much strength must go into these areas to hold them whether they are surrounded, by-passed, or cut off. We then garrison these areas, the size, number, and type of units being appropriate to the terrain which is to be held, trying to make the changes as undisturbing as possible. For example:

G-3, in planning a defense, will think in terms of

battalions. In other words, he applies the "yardstick" which we learn to use in measuring a division's capabilities.

He will note, as he studies his map for terrain, that area "A," let us call it, is a little large for one battalion, area "B" perhaps is about right, while area "C" is a little small. Now, if areas "A" and "C" lie in the same regimental sector, the regimental commander can make adjustments by temporarily detaching a rifle company (perhaps two) from one battalion and attaching it to another. If these areas lie in different regimental areas, G-3 will then have to make temporary shifts from one regiment to another.

It all sums up to making the most of what nature has done, rather than trying to adjust nature to fit our current Tables of Organization.

Let's see what a part of this new organization of the ground might look like (Figure 4).

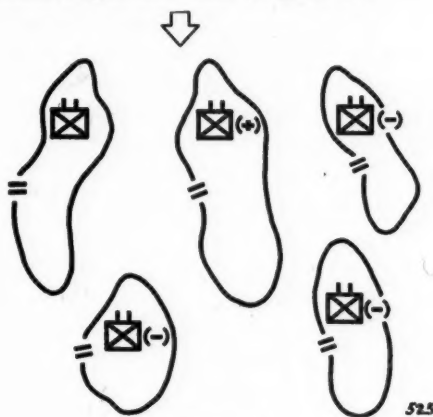


FIGURE 4.

Major points which we notice at once are:

1. The all-round nature of the areas.

Perhaps no other point is so important, except one, as this. In our old linear form of defense, when a breach was made by the German *Schwerpunkt* (thrust point), there at once began the lashing, knifing thrusts of a cobra, to right and left to rip open our soft sides and bellies. This was once a matter of mile-an-hour movement, but no more! Now it's tanks, self-propelled artillery, infantry on armored wheels and tracks, antitank guns! Certainly we talked "all-round" security, we paid it hearty lip service, but what did we do about it? Within the past month a battalion of infantry (more seasoned than we often see nowadays) was ordered to take up a defensive position. All faced the front and the position was ten yards deep!—Which brings us to the next major point:

2. The depths of the areas.

In our old linear defense when the main battle position was ruptured, that is, when the main line of resistance was broken, all powers from the company commander up were at once turned on the immediate job of throwing the enemy out, for it was realized

that we couldn't exist if the enemy remained on our side of our main line of resistance. All of our fires were coordinated there! When it was ruptured the integrity of the whole battle position was gone until it was restored. The great trouble was that any major attack *could* and *did* penetrate this main line of resistance. While we gave lip service to the technique of closing this gap we were not honestly organized to do so. But now with greater depth, we plan on and expect intrusion into our position, but we are organized to fight this intrusion from its flanks. For we must constantly keep in mind the fact that any modern army can concentrate enough force to surely penetrate a given point.

3. Next we notice the gaps between areas. What about them?

If we had a superabundance of troops we would like to man these gaps also (but without disturbing the integrity of the defense areas themselves). However, if we had that many troops we would probably be on the offensive. So we will fill these gaps with mines, dummy positions, an occasional machine gun or mobile patrols, and most of all *sweep them with fire*. These gaps we want to make the death areas for the enemy who intrudes.

What about the defense areas themselves? They must be protected against approach from *any* direction. They must be tank proof. We can secure this feature by shrewd use of the terrain, augmented by the use of obstacles, mines, and antitank fires. We must place our vital installations within them. And they must be *held at all costs!*

The biggest thing to be brought out here is the fact that the whole success of our plan is based on these two premises: one, that everything we have to save, e.g., artillery and command posts, must be placed within these defense areas, for what is left outside may belong (if left outside) eventually to the enemy; second, that we must plan and organize these defense areas to be held at all costs, and the men must be trained to realize this tremendous necessity. In the past, it has been found that in many cases men react badly to the sound of enemy fire behind them. They had perhaps unconsciously schooled their minds to the belief that they could combat an enemy on their front, but that when the enemy got behind them, all was lost. This *cannot go on!* The purpose, reason, and strength of the defense area must be explained to the men and indoctrinated in them. They must be brought to realize that with proper organization, they are in much better shape than the enemy behind them, for now it is the enemy who is surrounded—not they themselves. And the necessity of *holding* defense areas must be made a part of their deepest creed. Even the complete destruction of a defense area in the rear does not change this concept, because the forward areas are in position to close the gap behind the enemy and

stop his supplies and reinforcements, thus leaving the intruder in a pocket.

Technique of Control.—What changes does this make in the technique of control in the defense? We can't give the answers here, they aren't made up yet, but we can point at the problems.

We have always said that in defense, boundaries were usually low within the position, in order not to divide the responsibility of defending a good tactical area. And then out in front of the position, boundaries were generally high because our biggest concern out in front was that the responsibility for artillery fire on possible enemy assembly areas and good approaches (e.g., stream beds) be not divided.

Perhaps we can now visualize boundaries being used only for initial planning purposes, and later losing their significance.

The main line of resistance loses some of its importance as a term and may even fade out of the picture. Certainly, with our increased depth, it will not be possible for it to be the line "in front of which all elements of the defense must be able to concentrate their fire to break up the hostile attack." (Par. 610, FM 100-5.) Perhaps it may be replaced by a "planning line" for the artillery to use in making their fire plan.

We have always conceived of the final protective lines of machine gun fire as being interlocking bands of fire across the front of our position (Figure 5).

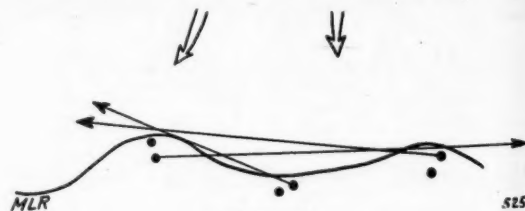


FIGURE 5.

We may now come to think of these final protective lines as covering the periphery of a defense area (Figure 6).

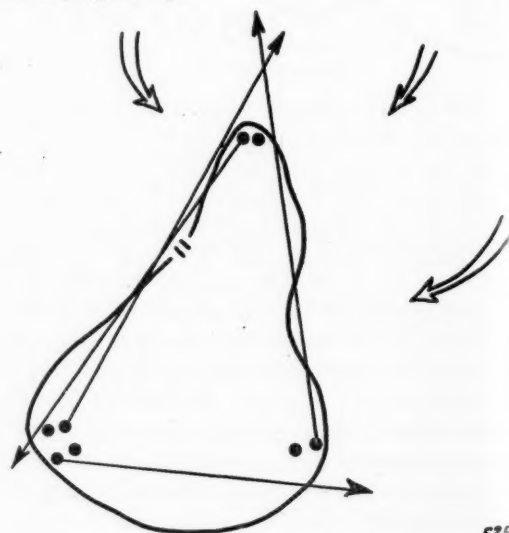


FIGURE 6.

A MODERNIZED CONCEPT OF THE DEFENSIVE

The major difference is that the fire protection given, instead of being lateral, has now more of a tendency to be in depth.

Limiting points in some form or other will likely remain. Perhaps they will not have the exact meaning they have now, that is, "to fix the localities where commanders of adjacent units coordinate their defense," but some coordination must be kept between defense areas or the situation could easily become completely disorganized.

The Counterattack.—The counterattack is the greatest destructive weapon in the hands of the defensive commander. Wielded properly it can be the clinching blow in the annihilation of the enemy. Improperly used it can result in the sacrifice of many men for no possible gain, as witness the German commander who led his battalions by night into the very guns of the British to be overwhelmed at daylight.

The greatest advantage to the counterattacker comes in the *personal knowledge* of the terrain over which he operates. In the daytime this is of tremendous value. In a night counterattack it reaches proportions not easily described. It is not only necessary for the staff officer who is making the plan to have intimate knowledge of the ground, but even more important for the men and officers who will do the leading to know the ground by heart by day and night.

The soul and essence of the counterattack is the *advance planning*. Without it, we have thrown away our only advantage over the enemy.

Normally we will plan our counterattack to strike

the enemy intrusion in its flank. By doing this we either force the enemy to redistribute his forces to face this new danger (which will decrease the number of forces available at the point of his spearhead) or else we cut through the neck of his penetration and leave his advanced troops surrounded. We must designate a limited objective so that we will not over-extend the limited force which we may have available. This also permits us to arrive at our objective with maximum speed in order to organize it properly before the enemy can react. The objective must be of such tactical importance that the enemy cannot continue his penetration without regaining the lost ground. Our plan must be extremely simple, to minimize the danger of anything happening which will throw it out of gear. In line with this we must plan all of the details of control even down to the exact marking of routes to the line of departure. All fires must be coordinated and all forces employed to make sure of success.

We can never be sure in advance of the exact location of our counterattack; so we must make numerous plans (each complete) to cover the probable contingencies, and the troops must be familiar with them and the ground they cover. For a suddenly improvised plan can do more harm to us than to the enemy.

Conclusion.—Dozens of questions come to mind as we consider this modernized technique. The answers are still being written on the field of battle and will continue to be for some time to come. It is incumbent on us to recognize and intelligently evaluate these answers as they appear, that lives may not be sacrificed to the great power of the status quo.

To decide is to adopt a solution firmly, the best one among the possible ones, and to hold to it firmly and without vacillations. There is nothing worse than vacillation, repenting of the decision made. Irresolute persons as well as impulsive persons will never be good generals. There only remains for the chief commanding officer who issues the order the task of supervising the perfect execution of what has been decided by him, which has now acquired the force of law. Others have to interpret it, and he should leave them the necessary liberty for it. An officer should never be interfered with in his execution of an order, nor should orders be cluttered with details—synthesis rather than analysis should be the guiding principle. Neither should one ever skip the chain of command in ascending or descending order. When done by a superior it shows disregard for authority, and when done by an inferior, it is proof of lack of courtesy, confidence, or discipline.

—General Kindelan, Director of the *Escuela Superior* of the Spanish Army.

The Transportation Corps—Its Organization and Major Functions

MAJOR GENERAL C. P. GROSS,
Chief of Transportation, Army Service Forces, United States Army

AN ARTICLE on Army transportation in this war hardly needs to emphasize the importance of the subject. The fact that our forces are engaged in every corner of the globe very nearly tells that part of the story. Today, more than in any other war in all history, transportation is inextricably bound up with every phase of our operations. It touches and concerns the vital interests of every element of the Army. It enters the picture at every step and turn, from induction to training and thence to far-flung fighting fronts, and from raw materials to finished implements of war and thence to the hands of men trained to use them to overcome the enemy. Back of every military operation is movement—movement of men, munitions, and material. All our strategic plans depend upon it.

It is equally obvious that this vital connecting link between our activities at home and our fighting forces abroad must be managed by those responsible for the success of our arms. Integrated operation from point of origin to point of destination must be assured. For the Army, the major part of this task is intrusted to the Transportation Corps, Army Service Forces, which directs and supervises all transportation by land and water for the War Department.

The Corps, as such, is a comparative newcomer to Army circles. It was created a little more than a year ago on July 31, 1942, in furtherance of steps toward unified control of War Department transportation which had been taken at the time of the reorganization of the Army of the United States in March 1942. There was no similar peacetime organization. The Corps is a wartime product, fashioned somewhat along the lines of its World War I ancestor, but having considerably broader authority and far more extensive operating responsibilities.

A brief historical statement will point up what was accomplished by the reorganization and establishment of the Transportation Corps. Prior to the reorganization, overall supervision of Army transportation by land and water was exercised by the Supply Division, G-4 of the War Department General Staff, but direct and immediate operating responsibility was parceled out among different War Department agencies, with resulting imperfect coordination. Direction of the Army's commercial traffic and operation of the Army Transport Service were vested in the Quartermaster General. Operation of Army Ports of Embarkation, Holding and Reconsignment Stations for overseas shipments, and

other transportation field installations, was in the hands of their respective commanding officers. Separate traffic organizations were maintained by Chiefs of Supply Services to look after their transportation interests as shipping and procuring agencies.

However well this division of functions may have served in peacetime, it was not at all equal to the demands of waging successful warfare. The bitter experiences of the early part of the first World War, when a loose transportation system obtained, and the advantages which accrued from eventual integration of transportation activities during that war, had not been forgotten. Plans were ready for unification and centralized traffic control as indispensably necessary to timely movements of men and materials to points of need in accordance with strategic requirements. Movements had already increased greatly during the weeks and months preceding our entry into the war, beginning shortly after the passage of the Selective Service Act, and it was plain with the coming of war itself that there could be no substantial delay in the execution of those plans.

Accordingly, the reorganization of the War Department, which was effected on March 9, 1942, paved the way for a unified system. The various War Department supply and administrative services and all Ports of Embarkation and their auxiliaries were consolidated under the jurisdiction of the Commanding General of the Services of Supply (now Army Service Forces), and among other duties specifically assigned to him was the responsibility for transportation and traffic control. In the process of reallocating and distributing these activities and duties, General Somervell, in the original organizational directive of the Services of Supply, also effective on March 9, 1942, established within the Services of Supply a Transportation Division, in charge of a Chief of Transportation, which brought together under a single head the various separate agencies referred to above. The stated mission of the new Division was—and with one exception this is still the case under the Corps—to direct, supervise, and coordinate all transportation functions for the War Department, and to operate all Ports of Embarkation, Staging Areas, and Regulating and Reconsignment Stations, now known as Holding and Reconsignment Points, for overseas shipments. The one exception relates to transportation by air and activities pertaining thereto which, pursuant to agreement between General Somervell and General Arnold,

were transferred from the Services of Supply to the Army Air Forces in July 1942.

A month after the Transportation Division was created a slight change was made in the interest of uniformity in terminology and it was redesignated as the Transportation Service. A little later on, however, the need of a more significant change began to be felt. Although amalgamation of functions had been accomplished and much had been done in the direction of building up a skilled staff and laying down lines of authority which would insure efficient action, in certain respects the requisites of a fully integrated transportation service were lacking. Among other things, transportation officers at headquarters and officers and men in the field wore the insignia of the Quartermaster Corps, the Corps of Engineers, and other Arms and Services, and were appointed by local commanders who could assign them at will to other offices and positions. Qualified transportation personnel were scarce and need of them was on the increase, and it was highly desirable that transportation officers remained transportation officers no matter under whose immediate authority. We wanted a Corps of our own for greater efficiency and esprit, and we wanted the same control over our men as was retained by other Army Corps. It was necessary also that responsibility be fixed for the development of T/O units for transportation activities in the field. On July 31, 1942, a Transportation Corps was established within the Services of Supply, paralleling in general the Corps of Engineers and the Quartermaster Corps, with its own distinctive insignia, and succeeding to all the duties of the Transportation Service.

This war has frequently been referred to as a battle of shipping. A generalization of this kind, emphasizing a single factor, cannot, of course, detract from the fact that modern warfare makes almost insatiable demands upon every element of our economy and presents difficult problems in every direction. It is unquestionably true, however, that ocean shipping has stood at the very forefront of our difficulties. It comes at the head of any list of the major functions of the Transportation Corps and the major part of the discussion which follows will be concerned with it and with other matters closely related to it.

A few comparisons between the conditions we have faced in this war and those of the last war will indicate how very much more complex our shipping problems have been. These conditions are all well-known, but they will bear repeating.

We had a relatively stable front in the first World War. Operations were concentrated in a single theater and shipping was largely confined to the North Atlantic. Today, our operations literally cover the earth, and the distances traveled are more than two and a half times as great as they were in 1917 and 1918. Army vessels put into more than 100 foreign

ports of call, many in strange and distant places and many having only the crudest and most primitive unloading facilities or none whatever. We are fighting behind harbors all over the world that were never meant to take anything except the smallest boats, and we have also had to face the fact that such facilities as existed might be bombed out before our ships could arrive. We have had to key our loading on this side to unloading abroad under all possible circumstances.

Again, in the last war approximately 40% of the requirements of the AEF were obtained abroad, whereas in this war our troops are being supplied almost wholly from this side and we are also furnishing enormous quantities of material to our Allies all over the world. On top of this, the demands of this war are vastly greater. As compared with the last war it takes more than half again as many supplies to sustain and keep the American soldier in fighting trim and readiness for action.

Our shipping difficulties have also been greatly magnified by reason of the emphasis which modern warfare places on mechanization. Equipment is far more technical in character, and a substantial part of Army cargo consists of bulky, space-eating items such as tanks and planes and landing craft, presenting problems in loading and stowage without parallel in the last war.

We have also had to contend with a more intense and more deadly submarine activity. The enemy has centered a large share of his strategy on attacks on shipping. Modern submarines—with longer range, greater striking power, and advanced wolf-pack fighting techniques—lie in wait to check the flow of men and to cut the lifelines of supply.

In addition to all this, presenting the biggest problem of all and intensifying all the other difficulties, we entered the war with a most serious shipping shortage for the tasks at hand. We had not made sufficient additions to our own tonnage in peacetime, and the merchant fleets of our Allies had been riddled and decimated by more than two years of war. Lack of shipping has been the biggest bottleneck. Since the earliest days of the emergency, there has been more cargo than ships to lift it. Happily, the present trend is toward an easing of this situation. The Nation's shipyards have recently been turning out better than five ships a day and some 19,000,000 dead-weight tons of dry cargo and tankers are expected to be built in 1943, outstripping anything that has ever been done in this field before. Combined measures, including increased escort strength and air coverage, and improved detection devices and weapons, appear to have shorn the submarine menace of some of its fangs. But we have not yet reached the point where we may safely relax in our concern about the adequacy of our shipping facilities. Demands increase as more and more troops are sent overseas to be continuously supplied. Shipping is still a scarce

commodity, and the problem of allocation is still with us. We must still plan and coordinate in order to spread our resources to the fullest extent possible and to insure their most effective use. We must still stretch to make them cover the ground and go the distance. Today, as from the very beginning, we must look carefully to our ships.

There has been no failure at any time to recognize the extreme gravity of the shipping situation and to take appropriate steps to insure the most efficient use of such facilities as were available. In January 1942, soon after the war was thrust upon us, President Roosevelt and Prime Minister Churchill created the Combined Shipping Adjustment Board "to adjust and concert in one harmonious policy" the work of the United States and British shipping authorities and "to make the fullest and best possible use of ships under both American and British control in the interest of all of the United Nations." Pursuant to this joint declaration the merchant shipping resources of the two nations were pooled, with each country, however, continuing to supply the bulk of its own needs with its own ships. In reality, therefore, there have been two pools, the Combined Board functioning in instances where interchange or combined use would serve the best interests of the total effort or where allocation of ships of one country to the other would meet particular needs according to their relative importance to the total effort.

The American pool is under the control of the War Shipping Administration, which was established by Executive Order in February 1942. Its functions include control of the operation, purchase, charter, requisition, and use of all ocean-going vessels under the flag or control of the United States, except combatant vessels, fleet auxiliaries of the Navy, and Army and Navy transports, and allocation of such vessels for use by the Army, Navy, other Federal departments and agencies, and the governments of the United Nations. It is specifically provided that "in allocating the use of such vessels, the Administration shall comply with strategic military requirements," and that he shall collaborate with existing departments performing wartime transportation functions, particularly with the War and Navy Departments, and with the ODT with respect to the relation of overseas transportation to coastwise and intercoastal shipping and inland transportation.

The Army has a long tradition in maritime operations and, through the Transportation Corps, it mans, operates, and maintains its own vessels. While the small peacetime fleet of Army transports has been greatly expanded by new construction, purchase, and charter, this fleet alone cannot possibly meet more than a fraction of the Army's needs and it has been necessary to draw heavily on the pool of merchant shipping under the control of WSA, and to a lesser extent, generally for troop ships only, we have had to depend on the shipping of our Allies.

There are competing demands on this pool and probably no other problem receives as constant and careful consideration as that of its proper division and distribution. A Joint Military Transportation Committee, composed of representatives of the War and Navy Departments and WSA in an associate capacity, sits in frequent conference and consultation, working to the end of providing maximum shipping to the Army and Navy consistent with the Lend-Lease program and with the maintenance of a minimum civilian economy. Where use of Allied shipping is involved, either by the British or by ourselves, a Combined Military Transportation Committee, on which the British staff is also represented, enters the picture.

Ships are allocated to the Army in response to statements of need furnished by the Chief of Transportation who is a member of the Joint Military Transportation Committee. Back of every request is a planned movement and a definite plan of troop deployment which has been worked out by the War Department General Staff, then reviewed by the Chiefs of Staff of the Army and Navy in the light of the relative importance of their mutual requirements, and finally brought into balance with the entire Allied effort by the Combined British and American Chiefs of Staff. These plans are not formulated in a vacuum, nor are they made on a day to day basis unless to meet some wholly unexpected crisis. In the continuing work of the Joint Military Transportation Committee, very definite conceptions are obtained as to the shipping that will probably be available over a considerable period, and it is one of the principal functions of the Office of the Chief of Transportation, performed through the members of my Planning Division, to keep the General Staff fully informed so as to enable it to work out strategic plans within the limits of known capacities. The result is that we have essential long-range and informed planning, based on the fullest exchange of information among all interested agencies, and that, subject always to unforeseen exigencies, firm advance allocations may be made by WSA to enable the Army to carry out its plans.

These rather general remarks should not obscure the attention to details and the close calculations which go into the shipping angle of every Army objective overseas and which support every use of the Army's own tonnage and every allocation it receives. The Office of the Chief of Transportation evaluates all shipping requirements, assembling and analyzing all pertinent data as to capabilities of ships—their speed, draft, capacity, and range—proper stowage and conversion factors, and tonnage and space needed for particular movements. It follows through by making the requests that WSA nominate vessels for Army use, and, once allocations are made, takes all steps necessary to see to and schedule the arrival of the vessels at designated Ports of Embarkation.

THE TRANSPORTATION CORPS—ITS ORGANIZATION AND MAJOR FUNCTIONS

Before looking in on the activities of an Army Port of Embarkation, a word should be said about the traffic control system by which cargo is moved forward by rail and truck to the ports for transshipment overseas. It is essential that the flow of materials from inland points to seaboard be maintained at proper levels, synchronized with the availability of ships and scheduled shipping dates, and carefully regulated and controlled so that the entire movement on land and sea may be as nearly continuous and unbroken as possible and so that congestion on the rails and highways and at ports and terminals may be prevented. The two stages of the complete movement by land and water are so closely tied together that attention to one and neglect of the other would inevitably lead to disaster.

The Army has been keenly aware of this and has had in effect since shortly after our entry into the war comprehensive arrangements for forwarding Army cargo to Ports of Embarkation. It has kept constantly in mind the lessons of the first World War when failure in the beginning to recognize the necessity of regulating this phase of the movement led to a chaotic traffic tie-up back of the eastern seaboard. At one time during the early part of that war, more than 200,000 loaded freight cars—enough if placed end to end to stretch nearly two-thirds of the way across the continent—were standing in that area, paralyzing traffic as far back as Chicago. They stood for days, many for weeks, some for months, waiting to be unloaded, not only out of service but occupying important track space and blocking access to ports, camps, and other important Government projects.

No such condition has existed in this war. The gateways have been kept clear and the ports have been kept in a fluid state, notwithstanding a far heavier volume of traffic.

This has been accomplished through a routing and release system operated by the Transportation Corps with respect to Army cargo and War Department procured Lend-Lease supplies. General and branch depots of the Army's technical services and other suppliers of such material for shipment to overseas destinations are required to secure a release and routing from the Traffic Control Division of the Office of the Chief of Transportation for every carload or truckload of export freight moved to seaboard. Not one carload or truckload of such freight can be started in that direction unless it is known—as far as it can possibly be known in advance—that it can be unloaded and the car released promptly on arrival in the port area. Port conditions must be carefully watched and rail conditions checked before shipments are released for movement. Daily reports of the number of cars on hand awaiting shipment and the number of ships in port loading for each destination are received from Port Agencies established by the Transportation Corps at fourteen principal ports.

Not only must the Army constantly know the volume and direction of its own movements, but there must also be the closest coordination with other agencies performing similar functions in regulating the flow of shipments to seaboard. A Transportation Control Committee has been set up for this purpose, composed of a representative of the War Department, designated by the Office of the Chief of Transportation, and representatives of the Navy Department, the Office of Defense Transportation, the War Shipping Administration, and the British Ministry of War Transport, and having close contact with the Office of Lend-Lease Administration. This Committee meets almost daily and complete information is received from each of the agencies represented and from all other cognizant sources as to all shipping scheduled to be loaded at each port for approximately forty-five days in advance. With this picture of conditions at hand, the requirements of all agencies are coordinated and the quantity of freight that may be allowed to move to the ports from time to time is determined. ODT permits are issued in blocks as a result of such determinations and these are utilized by the Transportation Corps in its capacity as a releasing medium by issuing individual shipping releases against such block authorizations.

A shipping release mechanism will not do the whole job, however, and watchful supervision must continue even after shipments from inland points have been released. There is no assurance in wartime that everything will happen according to schedule. Military requirements change, often very suddenly. An emergency call from overseas may necessitate deferment of a previously planned movement. Ships scheduled to arrive at a designated port may be torpedoed en route or forced into a foreign port by the danger of attack. It is thus essential that provision be made for meeting changes in shipping conditions which may take place after rail and truck shipments have been started on their way to port.

This essential continuing control has been made effective through the use of Regulating Stations and Holding and Reconsignment Points. Rail and truck shipments must report en route to Regulating Stations which have been established by the Transportation Corps at considerable distances behind the ports on the principal lines of communication. These Stations continue the watch over port conditions. If it develops that a scheduled movement cannot be completed, shipments en route to the port are halted before they reach the port area and are diverted to Holding and Reconsignment Points. These are huge facilities with both warehouse and open storage, and nine of them are now being operated by the Transportation Corps for the primary purpose of preventing congestion at the ports and in port areas. A tenth is in process of completion and will soon be ready for operation.

Three such Points, for example, one at Marietta, Pennsylvania, another at Voorheesville, New York, and the third at Elmira, New York, serve the New York port. Unlike ordinary storage depots, the intent is to keep them as clear as possible in order to withstand the shocks and surges of any emergency. Cars bound for New York may be diverted to one or two or all three of these Points, depending upon the location of the cars at the time they are halted and upon which of these Points can provide the most economical and efficient service. They are unloaded as promptly as possible on arrival and their contents stored until the original movement to port can be resumed or until a new destination can be assigned. Meanwhile, the cars are released for other service and port congestion is prevented.

This comprehensive traffic control system—embracing the original issuance of individual shipping releases and following each shipment through to its destination—has been effective from the outset, and, so far as Army freight is concerned, through the same agency. It has been an outstanding success in avoiding the serious port congestion which occurred during World War I and in helping to maintain a steady stream of supplies to shipside.

We come now to the Army Port of Embarkation, where our ships are assembled and made ready for scheduled departure dates, and where our men and materials are received from the Zone of the Interior for final processing prior to embarkation. It is the most complex of all field installations under the control of the Chief of Transportation and the most spectacular in its activities which encompass substantially all of the varied functions of modern military transportation and supply. In a very real sense it is the focal point of all our efforts.

Prior to our entry into the war the Army had three Ports of Embarkation, one at New York, one at New Orleans, and the other at San Francisco. These have been greatly expanded and additional ports and sub-ports (functioning to relieve the load of the major ports) have been established. There are also mobile ports, which may be moved intact to another port as occasion demands, and cargo ports which, as their name implies, are operated primarily for the shipment of Army cargo.

The New York Port aptly symbolizes the operations and activities of an Army Port of Embarkation. It includes Army installations erected in World War I and expanded, huge commercial terminals taken over in their entirety and also enlarged, and entirely new facilities as well. Among other things, there are freight yards, motor vehicle parks, warehouses, miles of docks and piers, and several large camps, known as staging areas, equipped to handle many thousands of men arriving for departure overseas.

Troops rarely proceed immediately to shipside on arrival at port. Instead, they are brought forward from the interior a short time in advance of the

scheduled shipping date in accordance with plan on the call of the Port Commander, and are received at these staging areas. Four such areas serve the New York Port. They are in reality complete Army camps, each being fully equipped to provide shelter and food and other services ordinarily found at Army camps. In addition, during the short time that the men are there, they must be given final physical checkups, units must be brought to full strength, personnel records must be completed, shortages in equipment must be made up, training deficiencies must be corrected. When the men leave for shipside and embarkation, they must be ready for immediate action.

There are also great areas for the reception of supplies, including vast terminal and warehouse space. Nearly six and one-half million square feet of storage space at the New York Port provide facilities for handling most of the ordinary cargo. There are vast buildings at the water edge, with spur tracks and traveling cranes, where work goes on day and night regardless of weather. In addition to the great number of lighters which serve our ships, there are tugs and other harbor craft, switching engines, tractors, lift trucks and other handling and loading equipment, and miles of holding track.

Ammunition requires the use of two distinct but integrated facilities. A new double-tracked pier has been built, extending far out into the bay, and back of the pier is a terminal freight yard which will accommodate some 400 cars. Cars arrive at the terminal on a pre-arranged basis, carefully scheduled so that there are never more on hand than a day's loading capacity at the pier.

Wheeled equipment and artillery are prepared for shipment at a large processing plant, complete with lighterage facilities and with an open storage capacity of 6,000 vehicles. Many vehicles now come to dockside knocked down and crated and ready for shipment, but others come in to be shipped as fully assembled units. They must be serviced, repaired, prepared to resist ocean weather, lightered to shipside, stowed, blocked and braced, or lashed to the decks. The magnitude of this job, which was almost non-existent during the last war, is revealed by the fact that there is one vehicle for every six men in a motorized triangular division and one for every four men in an armored division.

Seeing organized movements off, with their specific units of men and their impedimenta and initial allowances, takes thousands of Army and civilian personnel. An armored division requires at least fifteen Liberty ships in addition to the necessary troop ships. Every aspect of the loading must be minutely planned and controlled by the Port of Embarkation. The right supplies and the miscellaneous paraphernalia needed for each unit must be assembled, down to the last box of pills for a medical unit and down to the last wrench to repair a tank for a tank unit. Loading must be done according to plan, with regard to

the most efficient use of space and with regard to unloading on the other side. If the unit is expected to go into action immediately on arrival and combat loading is necessary, its essential equipment and supplies must be stowed in such a way that they can be unloaded swiftly and in the order in which they will be needed. Special care must always be taken to see that all component parts of highly specialized equipment are "married up" and shipped together so that the equipment will be ready to function on arrival overseas.

The work of the Port is never done. After troops and their initial complement of supplies and equipment have landed overseas, a steady stream of maintenance must be kept moving to them. Each Port has been assigned the responsibility for supplying particular overseas bases and theaters. The War Department prescribes the level of supply which will be maintained in the base or theater. It is up to the Port Commander to see that the supplies go out on time, and that the theater commanders receive what they want, when and where they want it, in proper condition for immediate use.

It is an immense undertaking. In the last war, our primary concerns were food, forage, and ammunition. In this war, thousands of items are involved, and the vast quantity of mechanized and motorized equipment calls for considerably more tonnage per man and considerably more detailed planning and effort to insure its orderly and timely movement. During the North African campaign, for example, the New York Port had to supply and ship approximately one-half million tons every fifteen days.

Some of the supplies go forward overseas automatically in accordance with previously determined requirements, while others go forward on specific requisition from the theaters. Requisitions received at the Ports must be processed and edited to determine what supplies should be sent and what action is necessary to make them available. The editing of these requisitions is no simple matter. It must be determined whether they conform to War Department policies as to supply levels, and whether special conditions justify exceeding those levels. Duplications must be avoided. What has already been sent and what is on the way to the theater must be known at all times.

It is not possible or practicable, of course, to keep on hand at the Port itself sufficient quantities of supplies to meet any and all requisitions. Certain reserves are kept there to provide for emergency shipments only. In other cases, edited requisitions are forwarded direct to general and branch depots where credits for supplies are maintained by the Port, or to the War Department with the Port's recommendation as to the action which should be taken. At the same time, the Port transmits information as to when the supplies should be ready for shipment

to the Port and how they should be code-marked to insure arrival at proper destination.

When the supplies have been set up in the respective depots, the depot commanders forward availability reports to the Port, listing each item and its weight and cubage. Cargo loading charts are prepared on the basis of these reports; the number of ships required is determined; and a cargo loading plan is made up for the convoy or shipment. Finally, when shipping space is available, the supplies are called in from the depots by the Port, for shipment overseas.

The overseas commanders are fully informed at every stage of the process. Copies of approved requisitions and of availability reports are air-mailed to them. As soon as loading is completed at the Port, copies of the manifests for each ship, showing description, weight, and cubage of each item on board and the hatch in which it is loaded, are forwarded by air courier, and loading cables, summarizing the manifests, are also dispatched. In this way, advance plans for receiving, unloading, and storing supplies can be made by the overseas commanders, and, more important, tactical decisions can be reached in the light of the equipment which will be available to them.

These are the normal processes of supply but the system must also be flexible enough to meet last-minute emergency calls from overseas. One example of emergency action, which paid far-reaching dividends, will show how much depends on the prompt fulfillment of requirements overseas and will also illustrate how the Ports must function in collecting and dispatching replacements where equipment is lost at sea. In the Summer of 1942, just after Tobruk had fallen to Rommel, some 300 Sherman tanks and 100 self-propelled guns were transported from the factory to the New York Port to sail to Egypt, fifteen days after the decision to send them had been made. A week later, one of those ships, with 52 tanks and 18 guns, was torpedoed in the Caribbean. Another fast ship was immediately loaded with replacements and started on the stern chase which brought it into Suez on the same day early in September that the other ships arrived. Those tanks and guns turned the tide against Rommel and forced him into the long retreat that ended in Tunisia.

Obviously, to accomplish these manifold supply tasks the interdependency of all elements represented at the Ports, under Port Commanders responsible to the Chief of Transportation, must be complete. All of them must do their full share in order to maintain the uninterrupted progression of troops and freight to and through the Ports in carefully balanced coordination with the capacity of the Ports, the availability of shipping, the requirements overseas, and the constant necessity of maximum speed. As inbound traffic develops and increases with the

continuation of the war, it must be cleared as rapidly as possible so as to cause the least interference with their primary mission. The Ports have a full-time, two-way job, and its peak has not been reached by any means.

While ocean shipping and the inland movement of export freight to seaboard are the most important of the activities of the Transportation Corps, there are many other things which engage our attention. Among other staff functions and in addition to those which I have described, the Office of the Chief of Transportation maintains liaison for the War Department with the railroad industry and other carriers, associations of carriers, and governmental agencies on all transportation matters affecting the War Department, and establishes and supervises a system of military intelligence and security with respect to Army transportation matters in the Zone of the Interior. Among other operating functions, it routes all inland movements of War Department freight consisting of one or more cars, and all inland movements of troops in groups of forty or more, computes freight rates for procurement officers in the field, and negotiates agreements with carriers for military traffic.

The Corps also has a large procurement program for small boats, including combat and training craft, harbor defense craft, supply and other craft, and for railroad equipment used in overseas operations. One of our biggest present problems is planning the transportation supply needs in prospective theaters of operations. In addition, we organize and train the port units which unload the cargo overseas, and the railway units which carry it to the front and conduct other railroad operations for the Army in zones of combat.

The Transportation Corps is young but it is doing a man-sized job. As of the present time, some 2,000,000 troops have been moved overseas, and some 25,000,000 measurement tons of Army cargo have been shipped overseas, or well over two and a half times as much cargo as was shipped during our participation in World War I. We must take our inventories on the run, however, and without thought of minimizing the difficulties which lie ahead. All hands must increase their efforts. The resources and energies of all of us must fully combine in the task of moving and maintaining the finest fighting forces in the world.

Combat Engineers and Grenadiers

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article in *Münchener Neueste Nachrichten*, Munich, Germany, 5 June 1943.]

WHENEVER we are reminded, and justifiably so, that the infantry carries the main burden of battle, then we must also remember to include the combat engineers. The engineer tears up entanglements, clears a path through mine fields, sets traps for enemy tanks, blows up pillboxes, and burns out battle positions and dugouts with the flame-thrower's stream of fire in order to facilitate the assault for his brother-in-arms, the infantryman; for the engineer also is basically an infantryman. He does all this side by side with the attacking grenadiers. Frequently he is in front of them, nearest to the enemy with his rifle, machine pistol, and hand grenade, and together with the grenadier crushes out the final resistance.

We are inclined to consider the combat engineers chiefly as technical troops. Certainly this is true, but their technical training is only a means to an end, as it is in the case of the communication troops, the railroad engineers, the mortar personnel, and the air corps. All of these units originated from the engi-

neers. It is remarkable that the hand grenade, the characteristic weapon of close combat, was developed by the combat engineers in the first World War. Although the infantry took it over from them, the engineers did not give it up as a weapon. More appropriately this weapon can be considered as the symbol of the close cooperation which exists between the grenadiers and the assault engineers, between the men who wear the black piping of the engineer and the white of the grenadier.

The conditions of modern warfare have led to widespread diversification of duties in all branches of the Army. This is also the case with the combat engineers who are already highly diversified. Therefore the designation "assault engineer" indicates a special function. To be a combat engineer means to be a trail blazer. In this sense the assault engineer is the true pioneer, for he literally "breaks the way" forcibly, and as a versatile assault-fighter, he closes in combat with the foe.

The German System of Active Defense

A. F. KOVACS

AT THE beginning of the present war the Germans were uniformly successful with their blitzkrieg tactics until the paralyzing cold in Russia suddenly stopped their war machine. The simultaneously-launched Russian counterattacks forced them in December 1941 to improvise a system of defense.

The first thing was to seek shelter from the bitter cold in villages and other "inhabited places," so often mentioned in the Russian war bulletins. With the forced labor of the natives they quickly constructed defenses that could resist attacks which, due to the heavy snow, were greatly impeded. The intervening space between the fortified settlements, weakly held, could easily be penetrated by the Russians. Attacks then came from every direction and the defenses had to be completed in a hedgehog fashion. As time went on the works were extended, in some cases capable of holding several divisions and able to withstand a long siege. They were, and remained, the pivots of the line. In the Russian official communiqué of 16 August 1943 we read about the fighting in the Smolensk sector: "Many inhabited localities prepared by the Germans for circular defense are surrounded by trenches and barbed wire obstacles as well as by large mine fields. Based on these fortifications the enemy offers stubborn resistance. . . ."

The place here described had been in German hands for almost two years, yet the circular defenses, as the Russians declare, formed the basis of their system. Evidently it must have been a fundamental tactical idea. What is its origin?

During their defensive battles in the last war the Germans realized that villages and towns could form centers of resistance, particularly if fortified. In the battle of the Somme the system was perfected. Manned by picked machine gunners, these pivotal points, though sometimes completely cut off from the rear, could resist for days. In the following year General Lossberg, appointed by the high command to reorganize the German lines, found the German defense doctrine, despite the above innovations, too rigid and too passive because its main principle was to cling to every inch of ground. He proposed to invigorate it with an offensive spirit and to make it elastic with counterattacks timed to do the greatest damage at the smallest cost. Discarding the old system of lines of trenches he suggested a deep zone with a forward area of pillboxes too small to offer individual targets for heavy artillery but strong enough to resist the fire of field pieces. Built on the pattern of the Somme battlefields, larger fortified places, mostly villages, could be placed at strategic points where the crews of the pillboxes could retreat.

The task of the forward zone, one to two miles deep, was to absorb the attack. The reserves held in the rear of the zone would counterattack the enemy, by now reduced in numbers, tired, and broken up, and smash him or force him to withdraw, abandoning the siege of the pivots. Adaptation of this system to the terrain was one of the outstanding features of Lossberg's reform. It worked so well that the British in their great Flanders offensive in 1917 could make no headway despite enormous casualties.¹

In July 1918 the Lossberg system broke down because the Allied tanks could easily ride through the forefield defended only by machine guns in compliance with the old tactics. Arguing that since the tank strengthened the attack the defense must be strengthened correspondingly, General Lossberg suggested the placing of numerous armor-breaking pieces of apparatus in the forefield. Otherwise the basic principles of his system, absorption and recoil, remained the same, tank or no tank. However, the German Army in July 1918 had no antitank equipment and attempts with field artillery placed in the forward area broke down. Retreat was inevitable, and before the reorganization of the German defense could be carried out as suggested by General Lossberg the war came to an end.

The Germans later attributed their tactical defeats in 1918 to the fact that the morale of their troops, unable to cope with the tank, collapsed. That their enemies had outsmarted them and, by restoring mobility to the battlefield, had beaten them at their own game was extremely mortifying, and a veritable tank complex developed in post-war German military literature. Not being themselves able to experiment with tanks owing to the military clauses of the Treaty of Versailles, they followed developments in other armies. It so happened that they learned most from the French.

On the other side of the Rhine the course of events was very different. The French had no aggressive designs and their only concern was the possibility of a lightning-like attack by the superbly organized Reichswehr of 100,000 professionals fully indoctrinated by General Seeckt with the idea of mobility and maneuver. Against this contingency they built the Maginot Line, but even that failed to reassure them completely. The nightmare of *attaque brusquée* breaking through and pouring reserves into the open rear, into the very heart of France, kept those among

¹For the best discussion of General Lossberg's system in the English language see Captain G. C. Wynne, *If Germany Attacks; The Battle in Depth in the West* (London, 1940). The original source is General Lossberg's memoirs, *Meine Tätigkeit im Weltkrieg* (Berlin, 1939).

them who had imagination and foresight restlessly seeking greater security. General De Gaulle himself wrote his *L'armée de métier* in anticipation of a German surprise attack.²

But De Gaulle and similar unorthodox thinkers in the French army could exert no influence upon the official French view which was steeped in World War traditions. At Verdun, clinging tenaciously to every inch, a rigid system of defense supported by massed artillery fire defeated the most determined German efforts to break through. This great success exerted a fascination upon the French military mind and kept it spellbound. Influenced also by the steady decline of the birthrate which could not replace the enormous losses in man power suffered by the nation during the war, there was a natural inclination to devise a tactical doctrine which would conserve life. They found the magic in fire power and made a veritable fetish of it. Fire power would conquer, fire power would defend; it would throw a protective cover over the infantry which would be engaged only in mopping-up operations. Naturally, fire power would require enormous loads of ammunition; therefore, it necessarily would lack mobility. In fact, it would function best in permanent positions, and hence the idea of the Maginot Line and the Maginot Line mentality which made the French military mind still more sterile.

Against these views, as rigid as the defense they advocated, the progressive French military writers thundered in vain. Among them General De Gaulle has acquired great fame, though there were a number of others less known to the general public but highly respected by the Germans. When German rearmament got into its full stride the high command decided to issue a new publication presenting the most advanced and most authoritative views on military problems. The first copy of *Militärwissenschaftliche Rundschau* of January 1936 devotes an article to the current views on mobile warfare in France. Two writers, Generals Loizeau and Allehaut received the closest attention.

The latter was perhaps the most profound French thinker of the pre-1939 era in opposition to the orthodox school. He completely rejected the fire-power theory, advocating instead an offensive doctrine based upon mobility and maneuver. He was the only French general who immediately recognized De Gaulle's armored divisions and warmly advocated them, though with modifications; that is, in closer cooperation with the other branches of the army. Like the Germans, he realized the importance of the airplane and of large scale motorization. His books³ read, in the light of Dunkirk, like symbols of the brilliant, never-dying French spirit.

²Cf. E. W. Sheppard, "Two Generals One Doctrine," *Army Quarterly*, XLI (1940), 105-18.

³*La guerre n'est pas une industrie* (Nancy, 1925); *Motorisation et les armées de demain* (Paris, 1929); and last but not least *Etre prêts* (Paris, 1935).

Loizeau was not as comprehensive as Allehaut and remained somewhat under the influence of the defensive doctrine. Like so many progressive thinkers, he too worked under the assumption of a successful German breakthrough inundating the rear of the Maginot Line. He elaborated his theories in a book,⁴ pointing to the great importance of highly mobile infantry which, adjusting its tactics to the terrain, could fight delaying actions of great importance even against mechanized formations. The great thing, however, was not to settle down to a rigid defense line which could be easily shattered by mass artillery fire followed up by mass tank attack.⁵ The line, on the contrary, should move and shift continuously. While one part resists in a more prolonged manner where the terrain is favorable, another part must hit the enemy and hit him hard on exposed flanks, dash into an unguarded gap in his lines, and disturb his communications. In other words, attack, harass, and confuse, and then get away as fast as possible.

In such a zig-zagging, recoiling, elastic defense, demolitions, mine fields, road blocks, and quickly-laid obstacles of every kind play a highly important role. Loizeau, therefore, proposed motorized engineer groups. If the defense should become more determined and lasting, the employment of self-propelling antitank artillery would be called for, operating in large fleets going in for the kill after the enemy tank forces had been decimated, confused, and disorganized. For a more lasting defense he proposed a deep zone dotted with tank traps, criss-crossed with ditches, concrete walls if time permitted their building, interspersed with heavily fortified centers of resistance, mostly villages, where massed artillery would dominate the surrounding country.

Loizeau's book fired the imagination of the Germans. He spoke their own language. He demonstrated the value of their much-worshiped idols of mobility and maneuver—even in defense! His views contained much of Lossberg's system, but improved by all the Frenchman's brilliance. There was an element of daring in it, of originality and bold initiative. They were the very ideas of the young German Army being trained at the time of the publication of Loizeau's articles in the spirit of General Seeckt's reckless blitzkrieg tactics.

Why did the German Army, trained in offensive warfare, pay so much attention to the defense? First, because of their interpretation of the Battle of the Marne, lost because they attacked everywhere instead of concentrating on the decisive right wing. Second, because it was very important in the Lossberg system to determine how long the various units in the forefield and middle zone should resist before withdrawal. *Das hinhaltende Gefecht*, that is, delay-

⁴*Deux Manoeuvres* (Paris, 1935).

⁵The classic illustration of this view is the breakthrough of General Montgomery's forces at El Alamein.

ing action, became in consequence one of the most discussed topics in their military literature, particularly in the period of early rearmament when the West Wall was not completed and a French mechanized attack, if attempted, had every chance of making a deep penetration. The modern views across the Rhine seemed fully to substantiate their apprehensions, since, quite logically, they took Allehaut's and De Gaulle's influence upon French military thought to be as profound as on theirs. Mechanized warfare of this type was too dangerous to the fatherland. A solution had to be found, and so the Lossberg system was up for drastic revision. General W. von Nehring solved the problem with great skill.⁶ Remembering the moral effect of the tank in 1918, he placed the emphasis on psychological support by supplying the foremost troops, even the outpost line, with a liberal number of antitank weapons. Like Loizeau he too advocated the employment of motorized tank chasers behind the zone of defense which he would deepen considerably around pivots fortified with all the ingenuity of modern engineering. Nehring's article was the last word in antitank defense and even today reads like a modern contribution.

The role of the engineers in mobile defensive warfare was discussed by another expert. His discussion is particularly interesting in view of the great German retreat of 1943 in Russia and Italy.⁷ He demanded full motorization, establishing the thesis that the most effective contribution of engineers in delaying action is to appear unexpectedly at key points and demolish, block, obstruct, and particularly lay mine fields unobserved by the enemy—and then get away as quickly as they came. Speed was the thing! In 1943 the Germans began using parachute engineers.

Just as Loizeau based his views on future possibilities, so the *magnum opus* of German defensive theories was worked out by General Leeb with the underlying thought of the ever-increasing efficiency of mechanization. Published in a series of articles in *Militärwissenschaftliche Rundschau* and later reprinted in book form,⁸ it is the modern version of Lossberg's elastic defense. Deeply impressed by the French school, Leeb came to the conclusion that, unless the zone of defense was deepened to distances up to fifty miles, tanks could break through and spread disaster. Speed must be combatted with distance and—still greater speed.

The book is a monument to *das hinhaltende Gefecht*. Leeb traces the origin of the idea and its development before and during World War I. He explains why defense was formerly neglected in the

German Army and why delaying actions and attrition tactics were not understood. But in 1917 and particularly in the retreat of 1918 the Germans were forced to learn the meaning of defensive warfare. Looking into the future, he proposes to integrate the principles of delaying action with Lossberg's elastic system without trying to lay down any hard and fast rules. In fact the general tone of the work is to overstress mobility and the active character of defense because only thus could he impress the German Army preparing for blitz. Therefore he rejects every thought of rigid defense or passive resistance. In meeting a large scale attack by mechanized and motorized forces he lays great importance on early detection, on camouflage, and on a most minute system of cooperation between the various arms. Only thus can the attack be absorbed and then frustrated by a vigorous recoil.

There are of course various elements in this vast zone of defense. Not the last among them are supply centers, headquarters, and distribution points. In actual practice, that is, in the winter of 1941-1942, these became strongholds of various importance built around villages and towns. Some of them succumbed to the onslaught of the Russians; others, like Staraya Russa, held out though completely encircled for months. The lines of communication between them, particularly in the winter when no alternate routes were available except the main highways and the railroads, were very important. Both sides concentrated their efforts on them. The fortifications and the garrisons in the intervals between hedgehogs, therefore, depended on the importance of the area, the season of the year, or the number of troops available.

To protect the main railroad which supplied Velikie Luki, one of the main strongholds, the Germans built a system of defenses in depth of six miles. In checkerboard fashion there were dugouts and battery positions of various strength with mine fields in between. The outposts were surrounded with barbed wire.⁹ Other important points like Orel, Kharkov, Belgorod, etc., were protected by even heavier lines; that is, a zone ten to twelve miles deep, divided into three regions each three to four miles deep with intermediary lines between them. "The frontal region is subdivided into three stretches, each a little over a mile deep, the first containing infantry battalions and mortar batteries, the second regimental reserves, light artillery, and heavy mortars, and the third divisional reserves and heavy artillery. . . . [In case of retreat from one region to the next] fire power of all weapons in the various defense zones was carefully arranged to cover all approaches to prepared positions, which included barbed wire, trenches, and mine fields. . . . To break

⁶"Panzer Abwehr," *Militärwissenschaftliche Rundschau*, I (1936), 182-204.

⁷Colonel Dr. Meise, "Neuzeitliche Sperrungen," *ibid.*, I, 746-71.

⁸*Die Abwehr* (Berlin, 1938).

⁹Described in an article from *Krasnaya Zvezda* published in the *Military Review* July 1943.

through, it is necessary to act by fire on the entire depth of the defense with coordinated action of artillery, aviation, tanks, and infantry."¹⁰

There is an absence of concrete and steel in these fortifications. Barbed wire is used only at certain sections. The main strength of the system lies in the cross fire of the battery positions and in the mine fields. To take such deep zones, an enormous amount of artillery is necessary. As many as 3,000 barrels for each mile of the front were used in the Orel sector on July 12, which was ten times heavier than the fire at Verdun in the other World War and five times the amount used at El Alamein in Egypt.¹¹ The result of this enormous concentration of artillery was announced in the Russian communiqué of 15 July 1943 in the following way: "North of Orel our troops pierced the strongly fortified defense line of the enemy on a front stretching 25 miles and in three days of tense fighting advanced 28 miles."

Evidently this was a major breakthrough which carried the Russian Army way beyond the German lines. Yet no further exploitation followed and it took the Russians exactly a month to reach Bryansk, just fifty miles farther west. What is the explanation? "Although the terrain is not very favorable for defense, the Germans rapidly constructed, in addition to their existing defense lines, much more defense in depth, using every rivulet, ravine, and small wood in the combat zone."¹²

This is nothing but the practical application of the theories of Loizeau, Meise, and Leeb which can be reduced to the maxim that the greatest ally of defense is the terrain. Thus the Germans make a new stand wherever the terrain is favorable, while the intervening country is turned into a vast mine field. The Russian communiqué often mentions such hastily improvised positions, usually the starting points for sudden counterattacks. Some of the very latest innovations of this mobile defense are dug-in

tanks covered by steel plates forming the citadels of improvised pivotal points, movable concrete and steel pillboxes capable of holding machine guns and antitank weapons; also movable steel plates which can be set up anywhere giving temporary protection to gun crews firing behind them. And mine fields and mine fields. . . . "It is highly probable that more mines are made today [in Germany] than shells. It will be one of the biggest tasks of Allied research to discover a more economical and faster operating mine detector or destroyer than anything yet existing."¹³

On a wide front the Germans in 1943 were forced by the Russians to abandon their permanent positions which they had held for two years. It is interesting to note that in their mobile defense they still retain the idea of pivotal points which are hubs of rail lines and highways. These are usually held much longer than the country around them, and act as hinges often retarding the advance of the enemy for weeks. The reason seems to be that modern fire power, requiring enormous weights of ammunition, can be supplied only at such crossroads of transportation lines. But often they are selected for purely strategic reasons.

In another theater of war a typical pivot was Catania, around which the great *hinhaltendes Gefecht* of Sicily was fought. The Germans evacuated it despite the furious attacks of the British Eighth Army only after the rest of the line had been safely withdrawn. The large scale demolitions, the quickly laid mine fields, and the sudden counterattacks made this campaign a good example of the new type of warfare. It is constantly being improved. Delaying actions hinged on strong points have now been made more effective with parachute engineers dropped on very short notice almost anywhere. Their sudden appearance in northeastern Sicily after the fall of Palermo made an orderly evacuation of the island possible for the Germans. The campaign in southern Italy bids fair to be an even more successful demonstration of active defense.

¹⁰Official explanation of Colonel I. Vorobieff, staff representative of the Russian Steppe Army (that took Kharkov) to American and British correspondents as reported by H. C. Cassidy in the *New York Times* 7 September 1943, p. 9.

¹¹H. C. Cassidy in *New York Times* 15 August 1943, p. 9.

¹²A. Werth in *New York Times* 25 August 1943, p. 7.

¹³A. Werth, reporting on reoccupation of Orel, *New York Times* 16 August 1943.

It generally happens that the troops who are attacked in their trenches are beaten, because those who make the attack always possess an impetuosity which those who merely defend themselves can never arrive at; besides, the waiting the enemy's approach is often an acknowledgement of their own weakness, and of their adversary's superiority.

—Voltaire in *The History of Charles the Twelfth, King of Sweden*

A Tropical Evacuation Hospital

[From an article by Colonel Morgan C. Berry, *Medical Corps, U.S. Army*, in *The Military Surgeon* July 1943.]

SET DOWN in a grove of coconut trees, practically in the midst of a jungle, with little or no equipment available for construction work, we faced the problem of providing adequate hospital facilities in this Southwest Pacific area. The site of our location is desirable from the standpoint of terrain, but the rainy season has somewhat aggravated our problems.

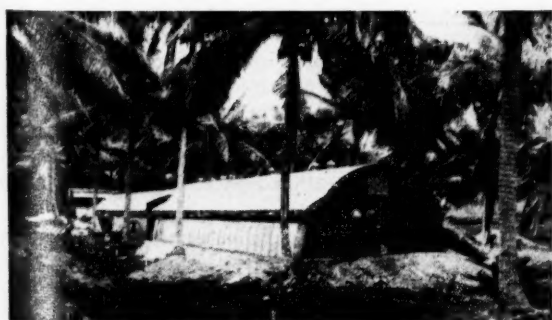
It was readily apparent upon our arrival at this station that an Evacuation Hospital, as such, would be of little value in this particular theater of operations.

Our primary objective therefore was to adapt our hospital to the conditions as they existed and convert our hospital into one of immediate usefulness.

Because of the humidity of the climate, the prevalence of insects, and the shortage of lumber for flooring, tents are inadequate for protection of patients from dampness and do not offer the desired security from insects necessary to insure effectiveness of sterile procedures.

An outstanding departure from the tent set-up in hospital construction is our Surgical Pavilion.

We were fortunate in securing two Quonset huts, 20' x 50' each, as well as concrete for the floor and base.



DOUBLE QUONSET TYPE WARD. VERY DESIRABLE FOR SURGICAL SECTION.

On the concrete floor 20' x 120', with a two foot high, six inches thick, retaining wall, a 50' Quonset hut was constructed on either side, giving an additional 10' by placing the bulk heads further out on the base. The huts are joined by a frame structure which comprises the sterilizing room. We have obtained a large electrically operated, as well as steam operated, autoclave. The steam is supplied from a small outside boiler. Leading directly into the sterilizing room is an entryway 10' long and 4' wide, screened in to

serve as a fly and pest baffle. It is sufficiently large to permit a litter to enter.

To the left of the sterilizing room, separated by a screen door and occupying the west hut, is the work and stock room, partitioned to enclose officers' and nurses' dressing rooms and showers. To the right of the sterilizing room, protected by screened partitions and doors, is the scrub-up and instrument sterilizing room, and three operating rooms. An entrance from the scrub-up room leads into a corridor along the south end of the east Quonset; 4' wide, it extends the full length of the operating section, and connects the three operating rooms, with double swinging doors for entrance to each. Two of these operating rooms are 16' x 16', and one 16' x 18'. Each operating room is partitioned off by plywood construction, 4' high, and screened in from that height to the ceiling. The interior side walls of the entire pavilion are of light green color and the ceiling is painted white. A con-



WARD INTERIOR, DOUBLE QUONSET TYPE, EJ BEDS.

tinuous series of windows, 44" in width with close-fitting shutters, provide ample ventilation and can be quickly shuttered in the event of a "blackout" or storm. The operating room lights have been constructed from the portable lights of the unit assemblage, without change, simply by removing the base, inverting the lights and attaching them to the ceiling.

Draining for the pavilion is accomplished through pipes emptying into a large soakage pit located in the rear. A 3,000 gallon cypress tank, mounted on a 15' scaffold, supplies the necessary water requirements.

Since its completion, several prominent surgeons have visited the pavilion and complimented us upon its construction details. Some have made notes on its construction to suggest that certain features be

incorporated into the construction of other hospitals. In my opinion it is the most improved type of construction for field service in the tropics, primarily because of its simplicity, utility, and ventilating features.

Needless to say, another important consideration was the scullery for washing mess gear and kitchen-

ware of ambulatory patients and the enlisted detachment.

One row of three Quonset tubs serve for washing kitchenware, and another row of three Quonset tubs serve for washing mess gear, with another dry-steam tub for sterilizing gear after washing. Steam is furnished by a small outside boiler.

Torpedo Bombers

[From an article in *Parade*, a magazine published for Allied Nations troops in the Near and Middle East, reprinted in *Britain* (British Information Services, New York) June 1943.]

TO GET THROUGH supplies to Mersa, Tobruk, and Benghazi the enemy had to run the gauntlet not only of our submarines but our aircraft, too, especially the torpedo bombers, the Beauforts and other, heavier, planes which we employ at night. It is the same today wherever the Germans are dependent on seaborne supplies. Only the routes have changed.

Picture the great torpedo base, Beauforts lined up on the tarmac, armorers wheeling "fish" on trolleys, crews crowding into the briefing room. Imagine the thunderous take-off, each aircraft lifting three-quarters of a ton of high explosive and delicate mechanism compressed within a slender steel tube.

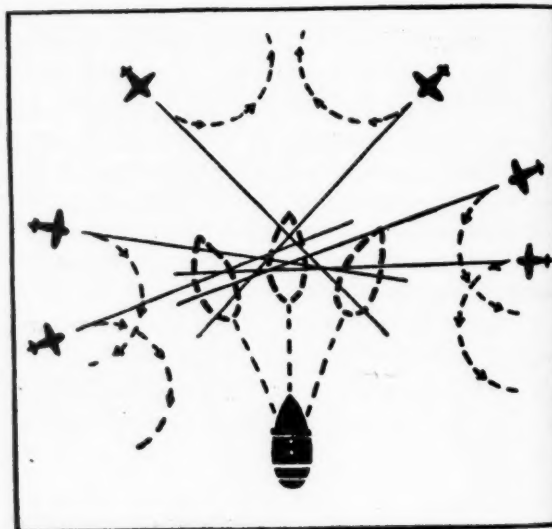
Two mighty Taurus engines, twenty-eight cylinders, 2,290 horse-power at full boost to get a Beaufort into the air, just a few feet off the ground. And then, getting airborne, the Beauforts stay there—only just off the ground. No soaring blithely to 10,000 feet for these pilots. Theirs is concentrated precision flying that imposes deep strain, which calls for a cold-steel temperament and many hours of extra training. Men have died trying to fly like this, just clearing sandhills so that the dust rises in clouds, and skimming out to sea with spray on the perspex.

It is a technique which has been worked out to enable aircraft to attack with the maximum of surprise. They may be heard but not spotted by the enemy until it is too late for flak ships to fire accurately. In any case the torpedo must be launched from a low level or the impact with water might upset the mechanism.

There is no more fascinating experience than to skim ten feet above the sea in the nose of a Beaufort. Fantastic impression of speed! The pilot stares just ahead, judging how fine he can make it, knowing that an error of judgment will put you all in, fifty feet under, before you can know much about it. You know too that if one engine cuts it will be a matter of split-second thinking, of pulling back the stick to stagger upward a hundred feet and try to limp back on the other engine, or put down and reach for the dinghy.

But all this is only incidental to the main business of the "strike." As soon as the target is sighted the Beauforts break off into two flights and approach from opposite sides. Then, whatever avoiding action the ships may take, they are certain to be struck by at least one of the torpedoes, even if some of the Beauforts get shot down afterwards.

Every man who goes out in a torpedo bomber knows his chances of coming back. Shipping that is invaluable in wartime does not put to sea without escort, and enemy ships in the Mediterranean are nearly all the time within range of their own protecting fighter screen. "Not much future in that" is the inevitable comment of a flier who takes up torpedo work.



The hazards of night attack are different from those of the day. The danger is not from antiaircraft fire, since the aircraft roar over the ships before those on board can realize what is happening. But there is the ever-present possibility of collision through milling around in the darkness, and flying at deck level is difficult enough in daylight, let alone in the dark.

Aircraft used at night have greater range, as they may need to stay out longer, seeking the target. Search is carried out by keeping low enough for a beam of moonlight to be reflected along the surface of the sea like a great dim yellow searchlight. Then the pilot flies round in wide circles looking down the beam. Any ship which crosses the beam is silhouetted—a perfect target.

Although in night attacks the aircraft are flown at low level the special trick is to throw them about like fighters. Once the enemy has been sighted it is almost certain that he is waiting for you, and the object is quickly to release the torpedo at point-blank range and get away. Probably four or five of the crews have spotted the enemy at the same time and the torpedo bombers are screaming round like monstrous gulls while all the ships in the enemy convoy let go with everything they have. It all happens in a few minutes after perhaps three hours of grim, monotonous searching, and it is quickly over. But generally when our torpedo aircraft strike there is a great blaze on the horizon as evidence of their handiwork.

The Reconnaissance Squadron, Armored Division

MAJOR ROBERTS S. DEMITZ, *Cavalry*
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ONE OF THE most powerful reconnaissance units in our army today is the Reconnaissance Squadron of the Armored Division. Knowledge of the organization and equipment of this unit drives home the fact that it possesses more organic firepower, size for size, than most similar units that may be found in any army in the world. This power is utilized to put punch into *reconnaissance*; it should not be exploited by using the squadron frequently as an assaulting task force.

Prior to our active participation in the present war, the Armored Reconnaissance Battalion made itself felt as a potent intelligence factor in the many maneuvers; reports from the units participating in Tunisian and Sicilian campaigns indicate that there has been no letdown in policy during combat. Good training and fine equipment have played an important role in accomplishing an excellent job. The Reconnaissance Squadron now to be a part of the Armored Division has ample means to better that record in operations to come.

The principal mission of the Reconnaissance Squadron has been stated as follows: ". . . to obtain information required by higher authority and to *get it to the interested party in time to be useful.*" The normal practice has been to attach an Engineer Reconnaissance Platoon to the squadron during operations; this permits the commander of the squadron to concentrate his main effort on the securing of information concerning hostile forces, while the Engineer Platoon gathers the necessary engineer information. This is a definite timesaver in the accomplishment of the squadron mission.

CLASSES OF RECONNAISSANCE

Reconnaissance may be divided into three classes, i.e., *distant*, *close*, and *battle reconnaissance*. *Close reconnaissance* is performed by the reconnaissance elements of the Combat Command or similar organization; *battle reconnaissance* is performed by all units engaged in actual combat. The task of performing distant reconnaissance for the Armored Division, then, falls to air reconnaissance agencies and to the Reconnaissance Squadron. The Reconnaissance Squadron will rarely operate in excess of a hundred miles in advance of its division; situation and terrain will generally demand a far smaller lead.

No discussion of a reconnaissance agency should fail to mention *counterreconnaissance* and its application to that agency. Counterreconnaissance, as a term, includes all measures taken to screen a com-

mand from hostile observation. A great portion of this task must be performed by friendly air. Ground measures include the establishment of a counterreconnaissance *screen*, either moving or stationary, that will prevent the enemy from reconnoitering a given area by destroying him, by turning him away, or by delaying his movement toward the troop concentrations to be concealed. The performance of a mission of counterreconnaissance is not a good assignment for the Reconnaissance Squadron; security elements from the main body will be better equipped to perform this mission. If the squadron is to perform such a task, it should be strongly reinforced with infantry, artillery, and any other arms dictated by the situation. In making up such a force, it must be kept in mind that the squadron commander has only a small staff. The Reconnaissance Squadron will continue to yield valuable information to the division commander only so long as it is a complete unit; if it is repeatedly forced into active skirmishes, it soon becomes depleted to the point where its effectiveness is greatly reduced.

EMPLOYMENT OF THE SQUADRON

Regardless of the mission assigned, the squadron must be fully prepared at all times to take active part in the following types of tactical action: *marches*, *security*, *assembly*, *attack*, *pursuit*, *defense*, *delay*, *withdrawal*, and *special operations*.

The mission of *reconnaissance*, that of securing information of the terrain and of the enemy, will normally be the task of the squadron. This mission will be accomplished by reconnoitering routes, fords, bridges, terrain features, hostile minefields, etc., and by securing hostile identifications, by executing zone or area reconnaissance, or, at night, by establishing listening posts and patrols.

Skill in zone reconnaissance ahead of the moving division is imperative in view of the difficulty involved in keeping well in advance of the division. At the same time there can be no slighting of points of importance, nor allowing of unobserved movement of hostile forces into the division zone of advance around the flanks of the squadron.

The front that can be covered by the squadron is quoted as being thirty-five miles, varying with terrain and the time available. One or more troops will often be attached to combat commands, and this must be considered when assigning a wide zone to the squadron. If effective reconnaissance is expected, no troop or platoon must be required to maintain a given

forward rate of movement in a zone of responsibility so wide or so difficult to reconnoiter that the commander of the element cannot be sure that his patrols are able to examine their share of the zone completely. The normal width expected of a reconnaissance platoon is 5 to 7½ miles; that of a troop will be 10 to 15 miles if a platoon is kept in reserve. The front of the squadron will be 20 to 30 miles if two troops are employed abreast. The holding out of a reserve reconnaissance force is extremely important in extended operations when front line personnel will become fatigued to the point where they become ineffective if not relieved for a few hours from time to time. In addition, if reserve reconnaissance personnel are available, the squadron commander will not find himself at a loss in the event that circumstances require an additional mission or operation. A reserve reconnaissance troop may be employed to the flanks to detect hostile lateral movement behind the squadron and into the division zone of advance.

The Tank Company is normally held in squadron reserve; its nature does not render it readily adaptable to reconnaissance missions. It will usually be kept busy if used only as a counterattacking force to extricate reconnaissance elements from mishap, or as an attacking force to engage hostile forces while the reconnaissance elements slip around and continue their missions in hostile territory. The Tank Company makes a poor outpost force for the squadron in bivouac; this is particularly true at night. It should be used as such only as a last resort.

COMMUNICATIONS

The squadron commander who persists in requiring painstaking training of communication personnel will eventually bless the day he decided to do so; if he does not possess perfection of operation of this instrument when he reaches combat, his operations are apt to be nullified no matter how good they be. His most vital tools are radio and messenger, although panels and other visual signals are highly important. Provision is made for the use of radio by the squadron even when other units must remain silent.

A simple prearranged message code is almost a necessity for use within the squadron; limited time requires the very brief transmissions made possible by such a device.

Commercial wire, or other such means, must always be considered; dependence upon these means, however, must not be allowed to develop.

STANDING OPERATING PROCEDURE

Each reconnaissance squadron should have a clear, brief SOP that will enable the key personnel of the squadron to function in normal situations with only a minimum of orders and instructions on the part of the commander of the squadron. Standard intelligence and counterintelligence procedure, methods of marching, formations, etc., should be outlined, as

well as certain simple standard tactical procedures; administrative policy for field operations, in conformity with division policies, should be included. Normally, the better trained unit will need only a very brief SOP. The document may be shortened and clarified considerably by adding graphic annexes.

SUPPLY AND EVACUATION

Supply and evacuation will prove a distinct headache to any reconnaissance unit. The Reconnaissance Squadron will often be spread over an area of a hundred miles or more; wounded personnel and disabled vehicles will offer a tremendous problem. The supply of fuel, ammunition, and food becomes a tedious factor under such conditions.

As a general rule, the division will be unable to move supply points forward to a point within easy reach of the squadron and hence supply hauls will be long ones. For that reason, the squadron should be given a fair priority at the installations serving the rest of the division. The squadron S-4 may see to this by appropriate contact with the division G-4.

The trains of the Reconnaissance Squadron are divided into "A" (combat), and "B" (field) trains. "A" trains include immediate essentials to combat such as maintenance, medical, fuel, and ammunition vehicles. Also, one kitchen truck will normally accompany each troop as part of the "A" trains. This is not true of other elements of the Armored Division, but has proved a near necessity to the Armored Reconnaissance Battalion in past extended operations. Bear in mind that this squadron will frequently keep on operating while the division is resting. The support allowed must be unstinted.

The "B" trains move by bounds in rear of the squadron, and are generally ahead of the rest of the division. They should be kept at least fifteen miles behind the squadron in order to avoid losses as a result of hostile armored or other attack. The "B" trains should not move during daylight unless such an expedient is unavoidable. The squadron S-4 or the commanding officer of the Headquarters and Service Troop may be designated as Squadron Trains Commander. This officer must realize at an early time just how difficult a job he will have from the standpoint of marching and protecting the trains in such manner as to enable administrative personnel to support the operation of the squadron properly. It is imperative that adequate communications exist between the squadron trains and the combat elements of the squadron.

Ammunition expenditure and the consumption of food by the squadron during operations normally will not give rise to any great problem of resupply. In general, the existing shortages may be nullified by resupply trucks operating under S-4 during the hours of darkness. The greatest difficulty to be overcome here will arise from the fact that inexperienced personnel in trucks insist on getting lost unless they are

THE RECONNAISSANCE SQUADRON, ARMORED DIVISION

convoyed; many will succeed in becoming lost in spite of any precautions taken. This difficulty grows rapidly as distances increase.

Extra fuel must be available to troop commanders at all times. The need for fuel increases greatly in rapid long distance moves. It is normal for one truck from the Fuel and Lubricants section of the trains to accompany each forward troop of the squadron as it moves out; when this truck is empty, it is released to the squadron trains, and will be replaced by a full truck. Every opportunity should be taken by commanders to refuel; no vehicle should ever become nearly empty, for that is the exact time that refueling is apt to be impossible.

Medical elements under squadron control should render close support to each troop that is actively engaged. If possible, medical elements under division control should render close support to the squadron as a whole. Where this is not practicable, the squadron surgeon should stand ready to effect swift evacuation of the wounded to the division Medical Battalion.

The motors officer of the squadron is often called upon to accomplish the well-nigh impossible in the repair or evacuation of disabled vehicles that may be many miles away. It is desirable to decentralize maintenance operations to troops as much as possible in the Reconnaissance Squadron, but this can be done only where previous training has been highly successful. For this reason, it becomes the task of the squadron motors officer to push assistance to all forward elements in an aggressive manner. The motors officer should be located near squadron headquarters on the march in order to receive early information of trouble. He should have with him a maximum in tools, spare parts, and maintenance personnel. The squadron heavy wrecker should be with him and not in the squadron "B" trains. Close maintenance support by the division, as in medical support, is highly desirable.

The final problem in evacuation to be discussed is the handling of prisoners of war by the Reconnaissance Squadron. This problem is sufficiently complex when applied to the Armored Division as a whole; in the reconnaissance unit a workable solution seems almost an impossibility. Some prisoners are sure to

be taken; some of these will be of such importance that immediate delivery from troop to squadron, and from squadron to division, will be imperative. This will require the temporary loss of one or more vehicles in order to accomplish delivery. Under routine circumstances, where immediate delivery to higher authority is not indicated, platoon or troop commanders will find it necessary to leave prisoners under the lightest possible guard until the squadron headquarters is able to take them over. A few personnel from squadron headquarters may be detailed as guards until such time as the division may be able to evacuate the prisoners. The division G-1 should see to it that a simple and workable system has been arranged with the Reconnaissance Squadron by the division Provost Marshal that will preclude the loss of time on the part of reconnaissance personnel in attempting to handle prisoners without assistance.

CONCLUSION

Let us close by discussing a few all-important housekeeping details as they apply to the Reconnaissance Squadron. No such unit will achieve a high degree of success unless its training and preparation in all details of operation have been completely effective. Try to picture for yourself the degree of success that might be expected of a unit that has no set procedure for breaking camp; whose vehicle crews are not completely organized; whose maintenance discipline is poor; whose personnel are allowed to blind themselves by putting up armored vehicle canvas tops at the slightest show of inclement weather; whose vehicular weapons are practically useless because the inside and outside of each vehicle is littered with all types of poorly stowed baggage or equipment; and finally whose personnel have not been instilled with the simple orderliness of mind that lends soldierly habit, and good military discipline to include *self-discipline*. In many cases, unfortunately, these are the points that are considered subordinate to, instead of equal to, training of a purely tactical nature. No unit can properly accomplish any mission unless it can start the mission on time, unless it can begin the mission with its personnel and equipment in top condition, and in addition, unless each man on the team knows his part so well that he will not falter.

In war the simplest way is usually the best way. Direct, simple plans, clear, concise orders, formations that facilitate control, and routes that are unmistakably defined will smooth the way for subordinate elements, minimize the confusion of combat, and definitely increase the chances of success.

—Infantry in Battle

Personnel Replacement Problems

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I. INTRODUCTION

IT IS A truism that modern war is machine war. A corollary to that truism is, however, often overlooked. The corollary is that personnel skilled in the operation of machines must be provided if the machinery is to function as and when it is needed. The task of securing, classifying, and assigning such personnel is not an easy one. Moreover, the task is not completed when an organization is manned for the initial activation. Losses suffered through normal attrition and battle casualties must be replaced if the organization is to be *maintained* at the necessary strength.

Army Regulations 615-26 (Enlisted Men—Index and Specifications for Occupational Specialists) illustrates the complexities, from the personnel angle, which the machine has imported into the realm of Mars. Issued 30 September 1942, this one Army Regulation contains more than 700 pages of printed matter. It lists in excess of 450 specification serial numbers, and it describes over 940 different types of military specialists.

Occasionally the impression is conveyed that only G-1 is concerned with replacement problems. It is true that under our current doctrine, as expressed in FM 101-5, "The specific duties of the personnel section [of a General Staff] may include the planning for and supervision of activities concerning . . . replacement of personnel . . ." What is not always recognized, however, is that *all* sections of the General Staff may be affected—vitally affected—if replacement procedures break down or fail to function. For example, if G-4 lacks the required number of truck drivers, supply will not operate smoothly and on schedule; or, if G-2's intelligence agencies are not at full strength, plans for reconnaissance may go awry. Again, the "battalion yardstick" which G-3 uses in measuring sectors or zones will be only a snare if units are not at T/O numbers. The truth is that every general and special staff officer must realize the importance of maintaining replacement pools for all arms and services.

The mere complexity of modern war and the accompanying problem of procuring necessary personnel need not, however, prevent the acquiring of an understanding of the fundamental principles which control procurement of needed personnel replacements. An understanding of these principles is essential for all arms and services; for no matter where an officer is assigned, he will at some time or other have to answer the same basic questions: *Where* does one obtain the men needed to bring an organization to full strength? *How* are they ob-

tained? *What* is to be done with them after they are obtained? *When* should replacements be sent to a unit?

To a consideration of these questions, this article is devoted. And the subjects are considered in the following order: (1) the present replacement system; (2) replacement requisitions; (3) reception, classification, and assignment of replacements; and (4) replacement principles.

It must be understood that in the space available it is impossible to describe all the replacement problems which confront an Army such as ours. For example, no effort is made here to depict the replacement system as it operates to supply needed personnel for the Army Service Forces in the zone of the interior. If the reader approaches this article with the understanding that the discussion herein is generalized and that it shows the replacement operations for the combat zone in the theater of operations, misunderstandings will be avoided.

The replacement system exists only as a means of keeping units at full strength. Unless a continuous flow of personnel is pushed forward to units that face the attrition of combat, the system will not justify its reason for existence.

II. THE PRESENT REPLACEMENT SYSTEM

The question, "Where does one obtain the men needed to bring an organization to full strength?" is answered by a study of the replacement system now employed in our Army. In the past our Army has run the gamut in replacement systems ranging from utter lack of them in the Revolutionary War to a complex corps system at one time in World War I, with each corps consisting of four "combat divisions," one "replacement and school division," and one "base and training division." Unfortunately we have not, in the past, always appreciated the necessity of maintaining a steady supply of trained replacements. Today, however, our basic doctrine enunciates the principle that the replacement system is designed "to insure the dependable and timely arrival of replacements at units as required."

Such "timely arrival" of replacements can only be insured by preparation and execution of an appropriate plan; this is a responsibility of the zone of the interior. Once the plan is perfected, however, there still remains the necessity for transforming the civilian into the soldier and sending him, through the appropriate installations, to the unit which has need for him.

Replacement installations are found both in the zone of the interior and in the theater of operations.

PERSONNEL REPLACEMENT PROBLEMS

In the zone of the interior these include the following: (1) Induction Station, (2) Reception Center, (3) Replacement Training Center, and (4) Zone of the Interior Replacement Depot.

From civil life, persons subject to military service are sent by the appropriate Selective Service Board to an Induction Station. The Induction Station, a military installation, "inducts" the selectee into the military service after appropriate psychological and physical examinations. From the Induction Station, the selectee moves to a Reception Center. There the selectee is tested, interviewed, and classified. As a result it is determined where and how he can best serve in the Army. Reception Centers send their reports to Replacement Training Centers or to newly activated divisions. As its name indicates, the chief concern of the Replacement Training Center is *training*—basic training. The training completed, the selectee, in going overseas, normally will be sent to a Zone of the Interior Replacement Depot.

This type of replacement depot is a relatively new installation in our replacement system. Its function is to insure that only personnel meeting War Department standards for overseas duty are shipped and that all administrative requirements in connection therewith, except those which are the responsibility of the port commander, are completed. It follows that the Zone of the Interior Replacement Depot will receive and classify replacements. It will, of necessity, check their qualifications; it may even offer additional training. In fact, a mobilization training program is now prescribed in which opportunity is given for the firing of the basic weapon and for physical conditioning. Much administrative detail must be accomplished at this installation, and many of the replacements need correction in minor physical defects. In addition, wills and powers of attorney may be desired. Furthermore, allotments may be changed

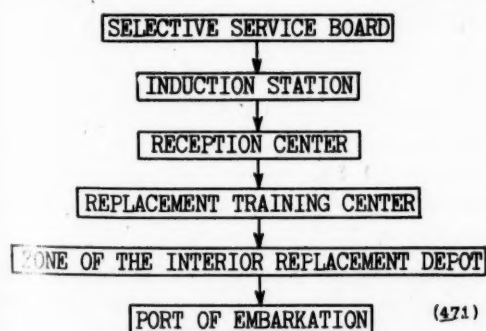


FIGURE 1.

or provided for dependents and for the purchase of war bonds. When these details have been attended to, there still remains the task of forming the replacements into appropriate casual detachments and shipping them to ports of embarkation for delivery to overseas theaters.

As indicated, replacements are shipped from replacement depots to ports of embarkation. Incidental-

ly, ports of embarkation maintain small replacement ports to take care of last minute needs. There they are forwarded overseas.

Figure 1 illustrates the various installations through which replacements pass in going from civilian life to a port of embarkation.

Installations which are concerned with replacements in the theater of operations include: (1) Replacement Depots; (2) Regulating and Assignment Group in the Adjutant General's Section of Army Headquarters; (3) Replacement Control Section of Regulating Station; and, finally, (4) the division or other unit for which the replacement is destined.

The replacement depot in the theater of operations is organized to facilitate rapid and orderly movement of incoming and outgoing personnel. It also provides classification and equipment, for mistakes in classification may have occurred, additional skills may have been acquired, and essential equipment may have been lost or broken. Such replacement depots provide pools of personnel with which to replace losses suffered. Under current directives "the establishment, initial stockage, and augmentation of" such replacement depots is decided by the War Department. Such decisions, of course, will be based upon projected operations, the actual or anticipated casualty rate, and available shipping facilities, as well as upon the number of troops employed in the theater. It is contemplated that the strength of such depots will be such as to permit of acclimatization and special training required for the particular theater as well as of the *prompt* replacement of losses in personnel.

Of course the operation of such depots requires personnel. That personnel is made available under current Tables of Organization (T/O 20-42 and T/O 20-45) which authorize the Headquarters and Headquarters Company of the replacement depot as well as the replacement battalion. The Headquarters and Headquarters Company of the replacement depot provides the administrative personnel necessary to handle not to exceed five replacement battalions. Normally such a depot has a gross capacity of 5,000 replacements. The depot, however, does not have personnel available for the special training that may be required for the theater. This personnel will have to be supplied from other sources located within the theater.

The replacement depot in the theater of operations is one of the most important in the entire chain of replacement installations. "Before forwarding to the Replacement Control Section of the Army Regulating Station, the replacements are trained, clothed, and given complete equipment and arms so that they are ready for combat." The depot affords the last check on the replacements' readiness for combat.

As with other regulating station activities, the Replacement Control Section of the regulating station

is a traffic control agency concerned with routing and forwarding replacements.

Another new link in the replacement system chain is the Regulating and Assignment Group which is organized in the Adjutant General's Section at Army Headquarters under the Army Classification Officer. The function of this group is to receive and consolidate requisitions for replacements from the Army's components and to maintain necessary records in connection with procurement of replacements. It therefore keeps records of credits available at replacement depots; it determines how available replacements shall be assigned when the demand exceeds the supply; it calls upon replacement depots for delivery of replacements when allocations have been made to the Army by higher authority; and it informs the regulating station as to the expected time of arrival of replacements which are coming forward as well as their ultimate destination. From the foregoing, it appears that here in the Regulating and Assignment Group are concentrated all matters which concern replacements for the Army.

The final link in the theater's replacement chain is the division (or other unit) for which the individual replacement is intended. His arrival at a division calls into play other G-1 functions such as reception, classification, and assignment of personnel. When the replacement reaches the division, he has completed a journey from civilian life to a unit in the combat zone; but unless the replacement is properly assigned in the division, much of the value of our classification and training is lost.

Figure 2 depicts, in a generalized way, the replacement set-up in a theater of operations. Included are the installations employed from the port of debarkation to the division or other unit which ultimately

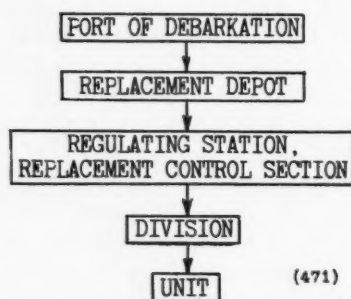


FIGURE 2.

receives personnel replacements. It is to be understood that this diagram is schematic only, for there are variations and modifications to be found in various theaters.

III. REPLACEMENT REQUISITIONS

One who understands the method by which personnel replacement requisitions are submitted, the routes that these requisitions take, and the manner in which they are filled, has at his fingertips the an-

swer to the question, "How are replacements obtained?" But a clearer understanding of the procedure by which requisitions are filled will be gained if we first realize that in reality there are two phases to the problem of actually supplying necessary replacements. The first is the supplying of replacements by the theater to using units; the second is the providing of replacements by the zone of the interior to maintain the required level of replacements in the theater. The combat division which has been withdrawn for rest and rehabilitation finds, after losses are taken into account, that it needs a certain number of men to bring it up to authorized strength. Not only does it need men—these men must possess certain qualifications. The division has done more than lose a known number of men—it has lost skilled personnel. So, as a consequence, if the division is to be restored to its proper strength its shortage must be made good by individuals possessing the same skills as those lost. As a result, it is customary for divisions to requisition personnel replacements on a man-for-man basis. They ask for exactly what has been lost and in exactly the same classification. The division therefore submits a "Consolidated Personnel Replacement Requisition" (WD AGO Form No. 212) in which it asks for the necessary replacements. Such a consolidated requisition is made up from the "Unit Personnel Replacement Requisitions" (WD AGO Form No. 211) which have been submitted by the division's subordinate units. Such requisitions, after passing through appropriate channels, are filled by the designated replacement depot in the theater of operations.

On the other hand a theater commander, in maintaining his replacements at a proper level, does not submit requisitions broken down to include specification serial numbers for actual vacancies. Instead he requisitions the zone of the interior, when desiring enlisted men, by asking for the total number of men required, enumerated by arm or service and without regard to specification serial number. He asks for officers by arm or service and by number.

These requisitions from the theater are filled by the zone of the interior through bulk shipments in accordance with requirement rate tables constructed to meet the needs of the theater.

The theater receives replacements "in bulk"; it assigns them to meet specific needs by specification serial number.

Requisitions from divisions go direct to Army; from Army they may go to replacement depots if allocations of replacements have been made, otherwise to theater headquarters for approval. Once approved, the requisition is sent to the appropriate replacement depot for filling. That replacement depot forwards the replacements through the Replacement Control Section of the appropriate regulating station to the division concerned.

IV. RECEPTION, CLASSIFICATION, AND ASSIGNMENT OF REPLACEMENTS.

Experience has demonstrated the value of a division Standing Operating Procedure for the reception, classification, and assignment of replacements. It is not the purpose of this article to elaborate on procedures which should be followed in each division.

It may be noted, however, that the Division Adjutant General is charged with the responsibility of executing the plans for the reception, classification, and assignment of replacements. He has the means for classification at hand. Plans for the reception of replacements must be flexible, for they must be such that whether 100 or 1,000 replacements are received at one time the desired result will still be obtained. Assignment of replacements normally will be by specification serial number if the replacements available equal the demand. If they do not, then priorities for assignment must be established. But establishment of such priorities requires a command decision.

V. REPLACEMENT PRINCIPLES

It must be clearly understood that divisions do *not* anticipate their replacement needs; rather, they keep up to strength by submitting replacement requisitions in accordance with schedules announced by higher authority. And these requisitions ask for replacements on a "man-for-man" basis: that is, they ask for exactly what has been lost and in the same classifications.

It is the duty of "commanders responsible for maintaining units at full strength," i.e., the theater commander or similar authority, to maintain a replacement pool in his theater from which divisions may receive replacements as and when needed.

Normally replacements should be sent to organizations just *after* the units have been relieved from combat rather than just before they enter or while they are engaged in combat. The tactical situation, however, may prevent this. For example, on Bataan the 31st Infantry suffered casualties totaling 195% of its T/O strength. Such losses could have been received only if the regiment obtained replacements while in combat, and such was the case. Receipt of replacements just after relief from combat permits receiving organizations to adjust their personnel and to absorb replacements at a time when the attention of the command is centered on reorganization. Arrival of replacements just before combat causes a unit to enter the fire fight without having had time to "break in" the replacements. And certainly the delivery of a contingent of replacements during combat only creates additional difficulties.

Men returning from hospitals in the theater are valuable replacements; they are already trained, and they have had battle experience. From the morale viewpoint they should, whenever possible, be returned to their old units. As illustrating the value of these

replacements, consider the following figures: During World War I, after the AEF had been engaged for about one year, it was found that 82% of the men admitted to hospitals were returned fit for duty. This meant that only 18% of the hospital admissions had to be replaced with personnel transported from the zone of the interior. When a nation is engaged in global war the import of these statistics is recognized, especially where shipping is the "bottleneck." Verification for the above conclusions is furnished by the Russian report to the effect that Russian hospitals are returning 70% of their admissions to duty. The same Russian report states that German medical service is inefficient because only 40% of German casualties are being returned to duty. The importance of an efficient medical service is readily recognized when replacement problems are considered.

In addition to handling normal replacements, the personnel replacement system is also employed as a means of forwarding stragglers, discharged prisoners, and AWOL's. Many of these, however, will require a military police escort.

VI. CONCLUSION

As with supplies, the impetus on replacements must come from the rear. Divisions and similar units, however, must make their needs known. In the functioning of the replacement system, administration must be streamlined to the end that emphasis is placed upon actual supply of replacements rather than upon perfection of the paperwork which is found in those installations where large numbers of men are classified and assigned. Furthermore, replacements must be pushed well forward within reach of units which need them. Numerous changes have been made in our replacement system, with the aim of expediting the delivery of needed replacements at the proper time and place. As the war continues we may expect to see more of these changes.

In World War I, Major General Fox Connor, who was G-3 of the AEF, was in a unique position to appreciate the value of a replacement plan. He is quoted as having said, "No single item of military organization is more important than provision for adequate replacements—not even the basic fighting organization of the Army itself." What was true in 1918 is still apropos in 1943.

Under our present Tables of Organization, divisions are streamlined. They carry no excess personnel; hence they have no replacements readily available with them. Experience shows that a division may lose its effectiveness in a matter of days after starting an operation. But to complete such an operation, the divisions must be kept at appropriate strength. A constant flow of qualified replacements must reach the combat zone. The need is imperative. The means are available. A personnel replacement system which operates efficiently will solve the current need.

Evacuation of Patients by Air

CAPTAIN MAURICE M. STEINBERG, *Medical Corps*

THE FOLLOWING is a report of what is regarded as one of the earliest large scale air evacuations of American patients in this war. It was pre-eminently successful. Observers have published data on the unfavorable influence of high altitude and prolonged flight on sick and wounded. In the evacuation of the Buna-Gona casualties, the sick and wounded were flown for a period not in excess of one hour nor higher than 9,000 feet, and in no instance was a patient subjected to the influence of this altitude for more than thirty minutes. Under these conditions of air evacuation no unfavorable results attributable to the flight were reported by those who carried out the definitive treatment of the patients.

During the Buna-Gona campaign 1942-1943, approximately 13,000 sick and wounded of the American and Australian Armies were evacuated from the battle front to the Port Moresby area. This evacuation covered a period of approximately seventy days.

The combat area from which this evacuation took place was a combination of dense jungle, treacherous swamp, and tall-grassed flatlands all covered with a thick, slimy mud. Torrential rains, disease-bearing insects, and high humidity added to the misery of the combatants. This combination of natural barriers constituted a battlefield as offensive and detestable as was ever encountered by any fighting force. The evacuation of sick and wounded from this terrain presented insurmountable difficulties. There were no roads. Enemy control of the sea lanes precluded water transportation. Therefore, the only method of evacuation available was by airplane.

Following preliminary first-aid treatment or the indicated surgical procedure at battalion aid stations, portable hospitals, or field hospitals, patients, having been rendered transportable, were prepared for evacuation. Stretcher-borne patients were carried by either first-aid men or native litter-bearers along tracks to what were known as "peep-heads." From the "peep heads," stretcher patients were transported by "peeps" to various air strips in the respective vicinities of the Buna-Gona area to await air evacuation. Ambulatory patients were transported by any vehicular means or walked along the track to the air strip. A medical unit or some Medical Department personnel were present at each strip in order to lend aid and feed these patients. Eventually, concentrations of patients developed about those strips which proved best for landings and take-offs. The maximum distance patients were either carried, transported, or walked prior to air evacuation was twelve miles.

The terrain between the Buna-Gona area and Port Moresby is difficult and hazardous. Along the Buna-

Gona coast there is a flat expanse extending inland along a very narrow strip. The coastal portion of this area consists of sandy beaches. Stretching inward from these beaches are a few cultivated coconut plantations and numerous native coconut groves. There are about fourteen landing strips in this area, some of which are cut out of the Kunai grass on the coastal areas, and others situated near or within the coconut plantations. Proceeding farther inland, the terrain abruptly changes to impassable jungle with tall trees matted together with vines and thick underbrush. Still farther inland, rolling foothills, pointed mountains, deep, winding ravines, and interlacing gorges are dominant. All in all, this area is regarded by campaigners as equal to the most treacherous terrain in the world.

The distance covered by air transports flying from the Buna-Gona area to Port Moresby was approximately 140 miles. This trip averaged fifty minutes from take-off to landing. The route followed crosses mountains which rise to 7,500 feet above sea level. The passes through the mountains are hidden by clouds most of the time, making the flight under existing weather conditions very difficult and dangerous. Altitudes at which the planes flew varied, dependent upon cloud formations and weather conditions. Thirty minutes of each flight was above an altitude of 7,000 feet. On one occasion an altitude of 15,000 feet was reached. The start of each flight was rendered particularly hazardous because the pilots flew as low as possible to avoid enemy detection. Frequently, landing strips in the Buna-Gona area were soft and boggy as a result of the rains, adding to the hazards of the landings and take-offs.

Planes employed for this evacuation were Douglas Transports (C-47), troop and cargo-carrying planes. These aircraft were not equipped with stretcher-carrying devices. There were no identifying marks such as red crosses on the planes. As a rule, they did not carry Medical Department officers or enlisted men. There were no provisions for the administration of oxygen. Their main purpose was to ferry troops, ammunition, food, and miscellaneous supplies to the Buna-Gona area. On the return trip they transported sick and wounded. The number of patients accommodated by the planes varied. Usually six to nine stretcher-borne patients were transported in one plane. Ambulatory patients were carried in groups ranging from fifteen to twenty-five. Frequently, stretcher and ambulatory cases were mixed. Early in the campaign the capacity of each plane was limited to nine or ten patients. This was due to rough fields and short runways.

In order to facilitate and expedite the unloading of patients and their dispatch to various hospitals,

EVACUATION OF PATIENTS BY AIR

a system of signals was arranged between the pilots and the medical officer supervising the ambulance receiving station at the field in the Port Moresby area. Pilots, upon arriving at the landing fields at Port Moresby, would indicate the number of patients aboard the planes by a flag signal system. The medical officer in charge of the ambulance receiving station estimated by this method the number of ambulances necessary to accommodate the evacuees, and dispatched immediately the requisite number of ambulances so that these would arrive at the dispersal areas simultaneously with the aircraft. This method entirely eliminated loss of time in removing and caring for the sick and wounded.

Of the 13,000 patients evacuated in this fashion, approximately 11,310 or 87% were ambulatory, and approximately 1,690 or 13% were stretcher-borne patients. The highest number of patients evacuated in any one day was 693.

Accurate data and statistics were available for the American evacuees, of whom there were 5,883. There were 1,570 wounded. The majority of wounds were inflicted by small arms, trench mortars, shrapnel, and bomb fragments. Bayonet wounds were noticeably rare. Surgical procedures of limited scope were performed in numerous small Medical Department installations located within the combat area and close to the place of casualty. Air evacuation to hospitals for definitive treatment was accomplished as soon as the casualties were rendered transportable. For chest wounds this period averaged four days, and for abdominal wounds seven days. The 1,570 wounded or 27% are classified as follows:

Wounds of

Extremities	67%
Chest	7%
Back	6%
Neck	6%
Head	5%
Buttocks	4%
Abdomen	3%
Others	2%

The diseases totaled 4,195 or 71%, classified as follows:

Malaria	57%
EUO	14%
Diarrhea	7%
Neuropsychiatric	5%
Dengue	4%
Scrub typhus	2%
Others	11%

There were 110 injuries or 2%, classified as follows:

Accidental GSW	32%
Contusions & lacerations	24%
Burns	12%
Fractures	12%
Sprains	10%
Others	10%

Statistics concerning the Australian evacuees are not included. However, following discussions with some officers of the Australian Medical Department, the conclusion was reached that their data closely parallels that of the Americans.

According to some observers, there are several contra-indications to the transporting of sick and wounded patients by air. Lovelace* of the Mayo Clinic points out that in the normal person anoxemia begins at about 10,000 feet. In the anemic patient the effects of oxygen want will be felt at lower altitudes. He also considers high altitude flight in pneumothorax as particularly dangerous. In cases of cerebral injury or laceration, oxygen is needed early and with ascent there is an increase in intracranial pressure. The Germans are apparently aware of these hazards, and Hippke†, Chief of Air Medical Services, reports that during the Polish campaign the pilots of the air ambulances were instructed not to fly higher than 3,000 feet. Hippke also states that pressure symptoms are theoretically to be expected in cerebral or abdominal gunshot wounds. He concludes that shock, inclination to shock, and severe anemia are distinct contra-indications to air travel. Armstrong‡ states that all cases involving gaseous distention of the abdomen are aggravated by ascent due to the expansion of contained gases; unless oxygen is provided, most cardiovascular and respiratory cases should not be exposed to high altitudes. Infected sinuses and middle ear conditions cannot tolerate even small changes in altitude without a great amount of pain.

The exigency of the situation in the Buna-Gona campaign did not permit serious consideration to these contra-indications. Evacuation was a necessity and the sole outlet was air transport. Patients with abdominal injuries, head or chest wounds, anemics, and all varieties were transported as soon as possible to a zone that was less hazardous and where definitive treatment was instituted. Observations made by the Chief of Surgical Service of the hospital which received most of these surgical patients led to his belief that "as far as could be ascertained by physical and clinical examination, no untoward effect resulted from air transportation in these cases."

The inescapable conclusion is, therefore, that when air evacuation of patients is possible within the restrictions of altitude and duration of flight as were evidenced during the evacuation of the Buna-Gona campaign, it is safe and should be the method of choice.

*Lovelace, W. R., Jr., *Proc. Mayo Clin.* 1941, 16, 221.

†Hippke, G. E., *Btsch. Militärarzt* 1940. 5. 1. Translation in *Milit. Surg.*

‡Armstrong, H. G., *Principles and Practice of Aviation Medicine*, pp. 483.

An Engineer Job in the Aleutian Islands

[An article in *Aviation Engineer Notes* August 1943.]



PROBABLY one of the most interesting engineering solutions of a tough problem was made by the Aviation Engineers in building a two-runway airfield on one of the islands in the Aleutian chain. The site was not chosen because it looked like an easy place in which to build an airfield, but rather because of its strategic location. There were marshes and hills and miniature lakes which presented a grim picture for the reconnoitering engineers.

Near the coastline and paralleling it was a long, narrow lagoon made by the flow of a creek into its northern end and filled by high tide through its narrow southern outlet. Here was a flat sandy bottom for runways if the water could be drained off and kept out. So the Engineers went to work and built a dam at the north end of the lagoon and diverted the stream so it spilled into the bay, and built another dam at the south end to keep out the tidal flow. Drainage ditches and dikes were built to catch the runoff before it entered the lagoon depression, and so a flat sandy strip for runways was obtained.

Not only did this Aviation Engineer battalion build these runways but they built the docks so that supplies could be unloaded on the island from ships and barges. They built a road system and a good many of the installations, technical and domiciliary, necessary for the functioning of an airdrome. There follows herewith an extract from the report by the Air Service Command Engineer on this project.

"For the first time in the history of Alaskan construction the project was started with sufficient equipment and materials. Several projects had been recently cancelled in the interior and on the North-

western coast of Alaska because of the change in the tactical situation. The equipment and materials for these projects had already been delivered to the dock in Seattle and they were diverted to this project. Some equipment was being delivered to another job and this was also diverted. Among this equipment were twelve D-8 tractors, two 2½-yard shovels, one grader, and several carryalls. The usual shortage of boats and barges for getting equipment and supplies ashore was notable by its absence. The only lack was Engineer troops. However, there were sufficient Engineer troops for airfield work and in the first period of construction practically all of the Engineers were placed on airfield construction.

"The Engineer Battalion (less one company) departed from an island of the Aleutian chain on August 26, 1942, in the teeth of a howling gale in the strangest assortment of sea-going craft that has been used in this war, not excluding Dunkirk.

"The landing was made under the protection of low-hanging clouds and a strong storm on August 31, 1942. No definite site had been selected for the field at the time of the landing but its general location had been determined. This location was to be somewhere in the creek or lagoon area. Ground reconnaissance was immediately made which resulted in a decision to divert the creek from its course and build the runway in the former stream bed. Equipment was brought ashore from the barges on which it had been shipped. Only one barge had been lost in the stormy 374-mile sea journey. Fortunately this contained no equipment, but did have about 150,000 square feet of runway mat. The first work was done

on the field September 3. A dike was built across the creek to hold the water out of the area selected for the runway. By September 8 the dike started holding and diversion ditches were cut. The creek had previously emptied into the cove but was now diverted to the north to empty into the bay. By September 10 all water was cut off. The resulting runway site was a bed of sand similar to any ocean beach.

"The Bomber Command Commanding Officer landed the first plane, a B-18, on this sand strip on September 10 after it had been leveled. It seemed doubtful that this sand would have sufficient bearing power when dry, especially at the south 3,000' of the fighter strip where a fill of approximately 27,000 cubic yards had been made. This fighter strip was made alongside the initial runway. A steel mat of the pierced plank type was laid on 100' x 3,000' portion of the fighter strip. The fighter runway at this time was 100' x 4,600'. It was later carried to a length of 5,700 feet. Laying of this 3,000 feet of mat started on September 10 and was completed September 12. The preparation of the site including the fill required ten days. The first planes to be stationed at this base landed on the initial strip alongside of the fighter runway on September 11. In addition to these fourteen P-38's, there were three C-53 transports and four B-17's which landed on this strip on the same day. Among the arrivals was the Commanding General, Eleventh Air Force. He was pleasantly surprised at the rapidity with which an airfield had been constructed at this forbidding-looking spot. He stated his desires for the development of this airdrome and placed as highest priority the construction of a bomber runway. It was decided to fill in the marsh, using sand from the surrounding hills, and make a useable strip in the shortest time possible, and later to strip the tundra from the adjacent area and use sand fill to make a final bomber runway. The initial bomber strip made by filling the marsh without stripping would then be used as a taxiway. It was estimated that it would require forty-five days to strip and fill the bomber runway which is now called the 'B' runway. The runway was completed in twenty-six days. This construction included stripping an area 6,000' x 200', filling 110,000 cubic yards sand, and laying 600,000 square feet of mat.

"Stripping started on this runway September 27 using four D-8 dozers and three D-8's with 12-yard carr.alls. Construction of revetments started the next day, September 28, using three additional D-8's. These hardstandings were made by excavating into the side of low sand hills. They became partial revetments by the natural banks which surrounded them.

"In the meantime, work had been progressing on the permanent dike and drainage ditch system to service the entire airdrome area. Besides diverting

the course of the stream it was necessary to construct drainage ditches and dikes to carry off the water that drained into the area that had formerly been the stream bed. Tide gates were constructed between the cove and the airfield site to prevent the tide from flooding the field. Drainage water was allowed to back up in the ditches during high tide and the gates were open at low tide to empty the ditches. Large pumps were installed at these tide gates to make it possible to empty the ditches during periods of storms when high tides might be constant and when greater amounts of water were draining into the field area. There was a separate system of dikes and ditches for each side of the airdrome. This system of dikes and drainage ditches is shown on the attached layout of the air base. Work continued on this drainage system from the start of construction until it was complete enough to be really effective. This required about four months, and actually involved more work and posed more problems than the construction of the runways themselves. Constant maintenance is necessary to keep the ditches open, the tide gates in operation, and the standby pumps ready for use. Soon after the field was opened a heavy storm occurred while the drainage system was still far from completion. The field was flooded for three days and operations and construction were at a standstill. Since the airdrome area was sand it was possible to put it back into operation just as soon as the water drained off the surface. The drainage system now completed will prevent any recurrence of this. In fact, the system is designed to work either way. In addition to draining water out it operates so that as much water as necessary can be retained in the area to keep the sand saturated to within a few inches of the surface. This makes the runway more stable.

"Practically all work on the airdrome has been done by an Engineer Aviation Battalion. This organization was reinforced in November by a battalion of the General Service Engineers. The work of the General Service Engineers has been mainly on roads and buildings for the ground forces and installation of post facilities. The Aviation Engineer Battalion also built two barge docks, a ship dock, a good many miles of roads, and several warehouses and other installations for the post. The landing was made and the field was in operation before the enemy discovered that the island had been occupied. The presence of fighter planes apparently discouraged them from bombing. Only two token raids were made. These were made at night by one or two planes with no casualties and no damage suffered. The Japs apparently discovered the presence of this base only because of the increased tempo of bombing attacks on Kiska."

The Civil Affairs Officer

CAPTAIN JOHN P. LEACACOS, *Army of United States*

WAR, OF COURSE, is not waged in a vacuum. The skirmish line of an advancing army is the apex of a supporting framework of supply depots, regulating stations, evacuation hospitals, repair shops, bivouac areas, and crowded lines of communications stretching back hundreds of miles. This vast mass of supply required by today's technological warfare is set flush in territory occupied by peoples, cities, industries, and governments. In addition to inflicting tactical defeat on the enemy, an army must control the area it occupies and everything within it or else face the danger of losing its organic cohesiveness and being swallowed up by the population as in a morass.

Hence the necessity for military government. The civil affairs officer administers military government in the name of the commanding general, theater of operations. Military government in the United States Army is not novel. The Mexican War, the Civil War, Samoa, Cuba, the Philippines, Siberia, Dalmatia, and the Caribbean provide rich historical material on the experiences and successes of the armed forces in this branch of military service. The civil affairs officer is thus not a new development in his function. He is new only in being one of the latest specialists officially designated as members of the special staff of commanding generals of theaters of operations, armies, or task forces. Civil affairs plans are integrated into the strategic, tactical, and logistical details of the general military plan of campaign and are adapted to the political and administrative situations anticipated in the territory being occupied. The civil affairs officer goes in with the assault forces. Today, civil affairs officers in Sicily, North Africa, and the South Pacific are a product of long-range Army foresight and hard-headed self-interest. They are representatives of our modern civilian Army, who have often left careers as American business and professional men in order to place at the Army's disposal their experience and abilities for the purpose of utilizing and developing the resources of occupied areas so that there will be fewer demands on the financial, shipping, and physical resources of the United States.

The term "specialist" as applied to the civil affairs officer is not entirely accurate. Officers performing certain civil affairs duties will be specialists in their technical fields but officers in charge of civil affairs in all phases of that assignment will have to be thoroughly conversant with all aspects of Army organization and practice. It is therefore essential to the complete understanding of this new cog in the Army's machinery that a clear exposition be given of five main points: first, the meaning of military gov-

ernment; second, the chain of command in civil affairs; third, the staff relationships of the civil affairs officer; fourth, the scope and procedures of his operations; and fifth, the crucial and over-all importance of civil affairs public relations in their widest sense.

FM 27-5, *Military Government*, defines our field thus: "Military government is that form of government established and maintained by force of arms over an occupied territory and its population." It provides the framework for the agenda of civil affairs. It supervises the existing civil government and economy of the area. But the most important distinction is this: Military government is the agency or means that civil affairs officers employ to serve their colleagues on the general and special staffs of a commander in order to aid in the fulfillment of the occupying army's mission. That mission is described in FM 100-10, *Field Service Regulations—Administration*, as follows: "The principal object of an occupying force is to provide for the security, support, efficiency and success of its operations." These objectives are to be gained by control of the population and seizure in the assault of vital installations and supplies of immediate value to the Army. The levers of control of the population and utilization of its resources, including labor, are control of the governmental machinery and detailed knowledge of the area's resources. This necessitates immediate "freezing" of civilian movement in the face of the Army's advance and guarantee of security to the Army's rear. Use of the instrument of military government to support its operations quickly brings the Army complications, however. An instrument, to be usable, must be kept in tolerable or acceptable shape. The complications ensuing are: The native civil government supervised by the military government must be politically safe. The population must be maintained alive and in health. These are the problems that give rise to politics, newspaper headlines, and headaches.

The buttress of the civil affairs officer in these perplexities is the fundamental principle of military necessity. This principle is the criterion on which measures involving the maintenance of law and order and the avoidance of conditions of hunger and disease are judged. In brief, the population must be helped to help itself so as not to become a burden on the Army and as a prerequisite of being physically able to work for itself and the Army. The measure of the help given the population is governed by what the Army can spare from its supplies or finds it necessary to spare. Dietary assistance, for example, may be based on minimum subsistence levels in accord

with living standards of the occupied territory, not by American relief standards. To reiterate, the job of the civil affairs officer is to use the territory to fill the needs of the Army, while at the same time he assists in maintaining the territory capable of supporting such needs. This again ties in with the overall goal of the military administration: To promote the political and military objectives of the United States through efficient government so that future operations will be aided and policies promulgated for civilian population by the theater commander and higher authority will be successful. As phrased in FM 100-15, *Field Service Regulations—Larger Units*, "Under any circumstances, the higher commander should be fully conversant with the political objectives so that his strategic plans of action may attain those objectives."

Ultimate responsibility and authority, of course, is traced back to the President as Commander in Chief. The limitations that the theater commander receives from higher authority concerning civil affairs are necessitated by the fact that departments of the Federal government other than the War Department have proper and legitimate interests in the occupied territory by virtue of statute or Presidential directive. The Civil Affairs Division, which in the War Department is responsible for matters other than military tactical operations in the occupied territory, is the channel through which other governmental departments present their policies. Such agencies include the State Department, the United States Treasury, the Office of Economic Warfare, etc.

In the theater the tactical commander has the final responsibility and authority in civil affairs at all times, from the first contact of the combat troops with the enemy population, at which instant military government begins, to the period of cessation of hostilities, when only garrison troops hold the area. Civil affairs officers are assigned to a task force for an operation and during the assault and initial phase of operations, operate as staff officers of their commanders. It is particularly important in setting up military government quickly and effectively that civil affairs officers take up their duties as soon as operations permit. Subordinate commanders and civil affairs officers are also directly responsible to the senior tactical commander and exercise only such civil affairs functions as are expressly delegated to them. When the fighting is over and only holding forces occupy the territory, the senior tactical commander may establish, if he sees fit, chains of command or lines of authority for civil affairs running directly to him and his chief of civil affairs officer. He may delegate to the officer in charge of civil affairs certain or all of his functions, subject to the theater commander's approval. Final responsibility for activities of all agencies under his control still remains, however, with the senior tactical commander, unless ordered otherwise by appropriate authority.

Depending on the stage of operations and the confidence vested in him by the tactical commander, the civil affairs officer may function at times in a dual capacity, as do many of his fellow officers on the special staff. He may be placed also in charge of areas and cities, with civil affairs teams and occupational military police at his disposal. In the initial phase these special police units, as distinguished from organic military police, are attached to combat divisions and enter the assault to seize sensitive installations, impound key records, and establish security behind the lines. The task force provost marshal directs these units in the operational phase, subject to coordination with the civil affairs officer. After the operational phase, such units may be placed under control of the civil affairs officer for security patrols and to enforce the regulations of the military government.

The heart of the civil affairs officer's staff work will lie in cooperation, collaboration, and coordination. Nowhere will his success depend more on his personality, intelligence, and balanced viewpoint. Tact and alertness, a thorough grasp of the Army's mission, and an expert knowledge of the occupied territory are essential to his performance. He should have broad administrative experience if possible, but especially, sound judgment, initiative, and ability to use the technical talents of others. The need for such qualities is obvious when one examines the relationships he will have with other members of the commander's staff. The vital nature of these relationships may be underscored in recalling that the civil affairs officer utilizes the instrument of military government to render specific services to the other staff members in the crucial zone of communications.

The chief scene of his activities contains the principal establishments of supply and evacuation, police forces, and all the agencies required for the immediate support, maintenance, security, and well-being of our forces. The lines of communication exert a dominant influence on the advance and operations of large forces. Major reinforcements in personnel, munitions, equipment, and supplies must be kept moving forward. Necessity may further require considerable contingents to hold and utilize occupied areas.

The cross-currents of demands made on the civil affairs officer, demands which must be met in favor of the Army as far as possible without destroying the capacity of the occupied area to aid the Army, may be seen from reference to the various duties of the general and special staff. The civil affairs officer either assists the staff by his own specialty or asks the staff's assistance on behalf of the area he is supervising. He obtains *all* he can *for* the Army and *what* he can *from* the Army. While taking, if available, only the basic minimum to satisfy the area's

needs, he prosecutes measures to aid the population to restore its own economy as far as possible.

The relationships with the four G's will be constant and intimate. According to FM 27-5, G-1 has policy control over the special staff civil affairs officer, although the expanding intricacies of the overall task has made imperative the creation of the Civil Affairs Division on the highest War Department echelon. Policy control over the military police and emergency feeding and evacuation of civilians is a G-1 assignment, which again concerns civil affairs. Similarly, G-2, with control over intelligence and censorship; G-3, with responsibility over combat plans; and particularly G-4, whose supply and administrative coordination is so important in the communications zone, are all officers consulted daily by the civil affairs officer.

Virtually all of the officers assigned to the special staff of theaters of operations or armies have needs and plans or resources which affect the occupied area and are in turn affected by civil dispositions. Problems involved in this two-way traffic of the civil affairs officer are obvious in a summary of special staff responsibilities. The provost marshal, for example, and the civil affairs officer have perhaps the closest contacts. The provost marshal's command of the military police, traffic control, civilian police forces, conduct of the troops toward the civilian population, civilian circulation plans, and anti-sabotage measures are among the actions of vital interest to the civil affairs officer. The signal officer must be seen on the use of civilian signal communications by the population, the surgeon on the health and sanitation of the troops as affected by the area, and on the use of civilian hospitals and the loan of medical supplies. The adjutant general supervises the prisoner of war information bureau which can be useful in fostering good public relations with the populace. The Army public relations officer must be acquainted with the need for consistency of policy on civil affairs news releases. The finance officer pays for hired labor, supplies purchased or requisitioned; acts which react on the territory's economy. The judge advocate has an interest in the tribunals of the military government. The quartermaster will be a key man because of his handling of all supplies common to the Army, particularly food, and because of his salvage supervision. The special service officer may wish to arrange furlough tours for the soldiers to visit historic sites in the area. The transportation officer supervises the railroads which the civilian population may want to use. The engineer demands labor to build shelter for troops or material, to construct roads and bridges, or to help operate utilities, especially since efficiency of troops must not be diminished by employing soldiers on work which can be done by available civilians. The ordnance officer may need extra repair facilities.

Governing this wide scope of activity are three basic considerations in addition to the principal one of military necessity. The first is flexibility. Plans must be laid for every contingency of today's fluid and changing events. Plans must be ruthlessly altered when necessary and must at all times conform to the military situation, the actual internal condition of the occupied territory, and the temper of the people. The second principle is that of complete and the latest information, which must cover every conceivable condition liable to be met in the area occupied. This means continuous reconnaissance on the scene, integration with all intelligence agencies, particularly the Office of Strategic Services, and frequent forward movement among combat troops by the OCCA (Officer in Charge of Civil Affairs) and his assistants, even though his official station is at the rear echelon of his commander, who can expect correct estimates of the situation only on the basis of accurate information. Third but not least is the prime factor of economy of effort. Not only is personnel limited for assignment to civil affairs duties but so is practically everything else the OCCA needs, particularly transportation, supplies and occupational military police units. The OCCA must become early accustomed to living in an atmosphere of scarcity, of exercising his ingenuity to keep the population as tractable as possible. Economy of effort underlies the secondary policies of military government—continuity of policy, retention of existing governmental machinery and political boundaries where possible, and avoidance of changes in the social customs or economy of the area that might affect the stability of the situation and cause repercussions for the Army.

The organizational pattern of the Allied Military Government (AMG) in Sicily is indicated by the roster of activities referred to above and follows plans laid far in advance by the strategists of the Combined Chiefs of Staff. Six general departments were set up. The departments, under a chief civil affairs officer for the Army Group commander, include a legal section, a financial section, a civilian supply section, a public health section, an enemy property custodian, and a public safety or police commissioner.

Priorities established by the theater commander and higher authority on the requirements of the Army and the minimum needs of the occupied territory govern the selection of departments. As conditions are stabilized and zone of communications demands mount, more specialists are used in the area, as, for instance, engineers who will supervise construction or repair of bridges and utilities and the general process of basic rehabilitation, the degree of that rehabilitation depending as ever on the maintenance of the occupied area as an effective base for the Army's security and support. Specialists will ordinarily be stationed at territorial head-

quarters, to be sent into the field as needed. Implicit in the six fields are complex problems of war courts, wages and labor, repatriation, currency, rates of exchange, price control and rationing, water supply, control of purchases of American soldiers, black markets and prostitution, imports and exports, and many other crucial factors liable to threaten the stability of the Army's controls and lines of communications.

Dealing with individuals and intangibles in a foreign population in a theater of military operations, civil affairs throughout calls for statesmanship of the highest order. Although in no wise charged with handling foreign relations, the proper province of the State Department, the theater commander and his civil affairs officer have the responsibility of so conducting their relationships with the occupied territory's population, of so representing United States and United Nations ideals and war aims, that the ultimate victory will not be impaired or the surety of a true peace jeopardized. It means that civil affairs in its essence is public relations in its fullest scope. The agenda of civil affairs are thus inextricably interconnected. No army in history ever achieved the desired result of cooperation by force alone. Cooperation is obtained by the creation and manipulation of attitudes—our own and those of the population of the occupied territory. Sheer necessity imposes the choice of trying to govern with a large military force and little consideration for public relations, or with

a smaller force and more attention to public relations.

It is evident that public relations encompass problems and policies of security, propaganda and intelligence, in addition to ordinary press and radio relations. All these matters recoil on each other and require the most thorough and careful integration by the theater commander. Security rests on the temper of the population ruled. The problem, beyond that of harmonizing directives from higher authority, is at bottom one of leadership and knowledge of men. It underscores the value of detailed knowledge of the population, its beliefs, customs and taboos, personalities, and feelings. It involves the sound pre-evaluation of civil affairs programs of any nature for possible boomerangs in results, of practical instructions to troops and civil affairs personnel themselves on behavior toward the population, of avoiding patronizing attitudes and careless promises and "losing face," of preventing enactment of measures likely to arouse or consolidate latent feelings of loyalty to the displaced regime.

In the end, the efficient and orderly fulfillment of the mission of the Army in civil affairs depends on the good sense and humanity of American officers. A long history of wise administration of military government is the surest presage that the end of World War II will see the Army of the United States add its greatest chapter to one of its noblest traditions.

The Importance of Terrain

IF WE look back on history, we cannot but be struck by the exceedingly important part that the appreciation or neglect of the capacities of ground has played in every campaign. The most brilliant victories have been won by maneuvers which, if not suggested by the physical features of the battlefield, were at least deprived, by the nature of the ground, of half their risk. Rosbach, Leuthen, Austerlitz, Friedland, Dresden, Vittoria, Orthez, Chancellorsville, the Green Hills of Plevna, are examples. Nor can we fail to notice that the object of the great masters of tactics in carefully reconnoitering the enemy was to discover the key point or points of his position, and to judge for themselves how each separate locality, wood, village, farm, or hill, might be turned to account and fitted into the plan of battle. In short, we see in many

most successful battles an almost methodical progression from point to point, each successive capture weakening the enemy's position and paving the way for a further and more decisive advance; and the method pursued seems to have been in every case the same. "By threatening the village on the left, seizing the wood in the rear of it, I shall attack the hill on his right, and having captured this, bring every available gun to bear upon the central ridge, and attack, under cover of their fire, in full strength." This, or something very like it, appears to have been the ordinary mental process of such leaders as Frederick, Wellington, Napoleon, and Lee, and in many respects it is still eminently adapted to the field of battle. (G. F. R. Henderson in *The Science of War*.)

Replacement of Tanks and Personnel in Battle

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NO DOUBT all Commanding Generals on the battlefield would agree on the vital importance of replacing battle losses in men and tanks as quickly and efficiently as possible. It may be, and indeed has happened in Africa, that a line of tactics or a decision to fight has to depend on the arrival of further replacements; and clearly a dominant factor in a long battle is not merely how few losses are incurred but how fast those that are suffered can be replaced. The problem of replacement has seemed on the surface a simple one; the general principles were clear; provided that there were a number of units strung along the line of communication through which tanks could be handled, replacements would pass forward along this chain to the armored regiments, crews joining in at some convenient spot. The trouble, however, about such broad plans is that they so often fail to take account of human errors, particularly under the strain of battle conditions; and indeed it is doubtful if many of the difficulties which arise in operations, could be foreseen without experience. It may be well, therefore, to show some of the mistakes that were made in the British Eighth Army in its early days, before describing the present organization in its final form.

When the need for some special organization was first recognized early in 1942, there was established a TDR (Tank Delivery Regiment) under army control and its subordinate TDS's (Tank Delivery Squadrons) which were generally put under corps. New tanks coming into the country or those repaired in base workshops were sent to TDR where they were given a general check and stocked with the necessary reserve rations, water, gasoline, and ammunition. They were then sent forward to TDS on transporters. If full crews were available at TDS, only a small ferry crew would be sent forward from TDR. Alternatively, unit crews might have found their way from the battlefield to TDR and be put on the replacement tanks; or corps might have demanded full replacement crews to make up losses, and these would be taken from the pool held at TDR.

Similarly, tanks repaired in corps echelon workshops were sent to TDS who serviced them and supplied them with crews returned from battle. They were then sent forward to armored divisions and regiments when required.

This organization had an unfortunate start during the battle of Gazala in May 1942. TDS was forced to move hurriedly on more than one occasion; there was inadequate control of crews who got scattered throughout various replacement and transit camps;

while the pressure to get fresh tanks forward resulted in crews being mixed and sent to wrong regiments and tanks going forward to battle without their proper reserve supplies. It was not entirely the fault of the organization; but it did reveal its many weaknesses and, more seriously, it led to a certain distrust of TDR and TDS by armored formations.

These main faults were apparent. Tanks were inadequately inspected and serviced before going forward from TDS with the result that, on arrival at the armored regiment which had neither the supplies nor resources to make up the deficiencies on the battlefield, the tank was useless or at least unreliable. This was due to the facts that the personnel at TDR or TDS were not sufficiently experienced in the practical handling of tanks to check the necessary items and that the crews did not always check the state of the tanks before they left TDS.

The second fault was the inadequate control of replacement tanks going forward. It seems reasonable enough to say that parties of tanks shall go from TDS to Division Headquarters where they will be given further instructions for joining their regiments. In fact, what frequently happened was that of a party of three or four tanks from TDS, a couple would break down on the way and nothing might be known of their plight for a day or two, since their departure from TDS was not signalled to the division and they themselves were not in communication with anyone. The remainder might manage to reach Divisional Headquarters, where they would see before them a mass of vehicles spread over a large area. The leader, who might be a junior corporal, probably had only a vague idea to whom he should report and no idea at all how to find him. He would therefore ask the first friendly-looking person he saw, who, not being the right officer but being anxious to help, would give erroneous instructions for going forward, with the result that the tanks might be lost for several days.

The third and most serious fault lay in the handling of the crews. TDS was never designed adequately to administer and look after the numbers that in fact accumulate in battle, up to 200 or 300 men at a time from each combat command. Often they were sent back to TDR where they might get mixed up with the general replacement pool or from where they might even reach army transit camps. In either case they were temporarily lost to their regiments and took much time to recover. At TDS there was not the equipment to give them what they needed. A crew which has fought for two or three

REPLACEMENT OF TANKS AND PERSONNEL IN BATTLE

days and then had its tank blown up under it needs much attention and careful treatment if it is soon to return to the battlefield in fighting form. In those early days this was lacking; the living conditions were uninviting and cheerless, and after a day or two at TDS, crews were in no better form than when they arrived. Finally, TDS had not the intimate knowledge of the tank personnel to be sure of putting the right crew on the right tank. For instance, there might appear at TDS the commander and gunner from one tank and the driver and loader from another. Being all from one regiment it seemed reasonable to form these four into one crew and send them forward on a replacement. But it might well be that the regiment had been carefully keeping those men apart because they were unsuitable or disliked each other—and every tank officer will agree that unless a crew are a good match and firm friends, their tank will be a weak link in the troop.

The first steps taken to improve matters were to rule that crews coming out of battle should never be sent back beyond TDS, and to order each armored battalion to send an officer to live at TDS. By the first it was hoped to avoid losing the crews amongst various army camps and installations. The battalion officers were to look after their own crews, help with their administration, and particularly regroup the odd men and allocate them to replacement tanks. These two steps certainly improved matters but still

the handling of the crews was sketchy, while a detailed system for sending the tanks forward had still to be devised.

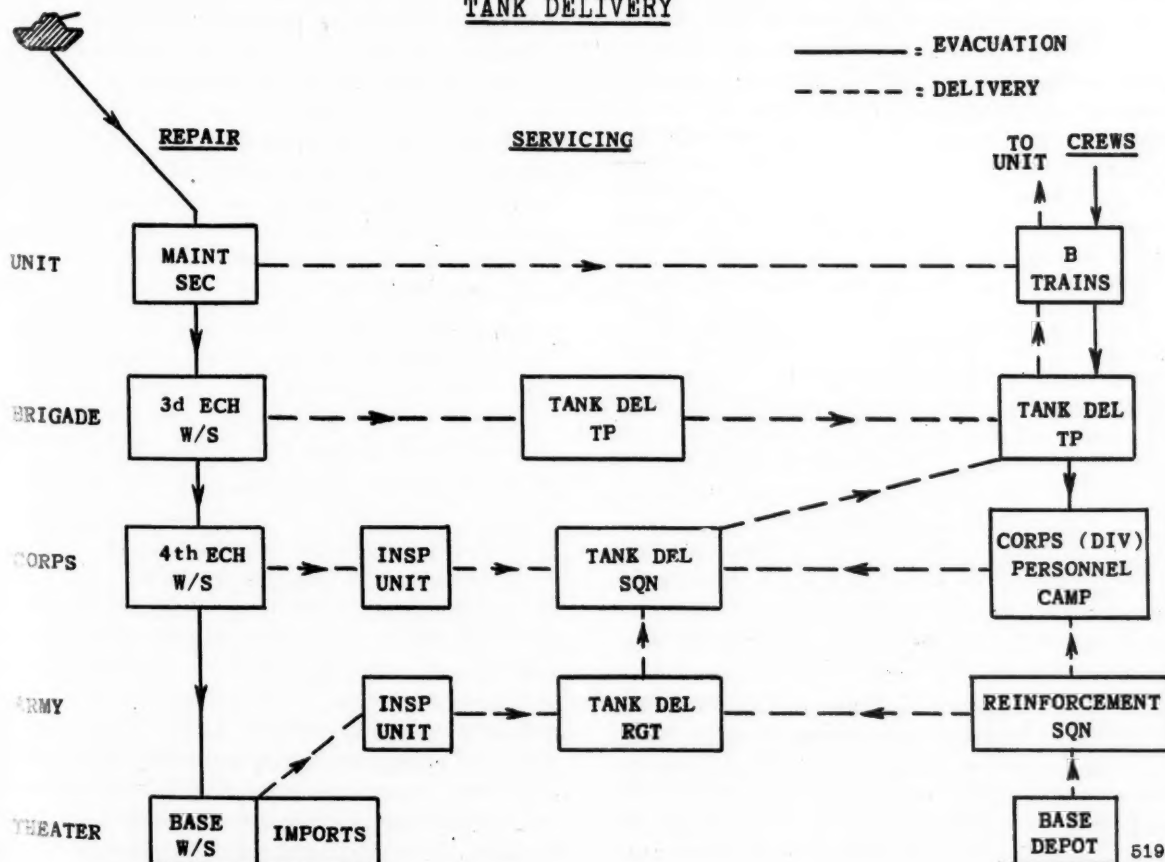
After many experiments had been made, principally by 22d Armored Brigade, 7th Armored Division, and X Corps from Alamein onwards, the system outlined below was finally evolved. It is not claimed that it is necessarily the final answer or that all those concerned are yet sufficiently trained in its operation. It did, however, prove workable in battle conditions and, most important of all, won the approval and support of the armored divisions and battalions.

Theoretically at each stage in the system there should be separate units for (a) repair, (b) inspection, (c) servicing repaired tanks, and (d) handling crews.

These different units must be located near each other, and there must be close personal liaison between the commanders. They must be within easy reach of supply points or dumps for rations, gasoline, etc., and for spare parts and equipment. Finally there must be good communications between the Tank Delivery units and the armored formations with whom they are working.

Within the unit the problem is simple. Lesser tank repairs are done by the unit maintenance section while the crews remain with them in the "B" trains area. There they can be well looked after

TANK DELIVERY



and re-equipped. Crews from tanks destroyed in battle also go back to the "B" trains.

If a tank goes to brigade workshops, its crew accompanies it and is handled by the TDT (Tank Delivery Troop) which lives beside the workshops as an integral part of it. At this stage it does not matter having the same unit servicing the tanks and handling the crews. Being an organic part of the brigade, the TDT knows the armored regiments and battalions well, takes a close, personal interest in the crews, and is frequently visited by officers from the armored units. Only tanks which can be repaired within twenty-four hours are kept in brigade workshops. If work is undertaken over this time limit, either the workshop cannot move as quickly as it must be able to, or it has to leave damaged tanks on the ground. Further, while crews are waiting at TDT, there may be replacement tanks ready for them at TDS whose delivery to armored regiments would be thus delayed. Crews are kept with the twenty-four-hour repairs since there would hardly be time to get them back to TDS before their own tanks were ready.

When the tank is repaired, it goes across to TDT where it is checked and serviced, and taken over by its original crew. The workshops and TDT are always located near the quartermaster battalion bivouac from which rations, gasoline, and ammunition can be readily obtained. This is important in order that TDT may not have to carry large quantities of supplies and thus burden itself with additional trucks which can ill be spared. The crew checks the supplies as they are put into the tank and the tank commander signs a schedule specifying the details and stating that the tank is in good condition. The tank commander takes one copy of this schedule which also shows detailed instructions for his move forward to Brigade Headquarters, including route, check points, to what officer he should report on arrival, and the frequency and code name which he is to use on his radio. There is a link from the workshops to Brigade Headquarters to which the tank must net its radio before leaving TDT. It must call Brigade Headquarters and get an acknowledgement, and then during its move forward, periodically report its progress or any breakdown that may occur. On arrival at Brigade Headquarters it reports to S-4 who directs it to its armored regiment or battalion and at the same time signals its battalion that it is on its way. The tank remains on the brigade net until it has reported its arrival at the battalion. Thus it is under direct control at all times and can be helped if it gets into difficulties.

When tanks are beyond brigade workshops repair they are taken back on transporters to corps workshops. When their repairs are completed, they go across to an Advanced Inspection Unit. This is independent of workshops and under army control. It therefore provides a second check which gives con-

fidence to the armored units and also pleases the workshops who, while jealous of their reputation with the fighting men, realize that under field conditions they cannot always guarantee to turn out a perfect tank. From the Inspection Unit it goes on to TDS who put on board its rations, etc., check the radio, and supply missing equipment such as compass, spare gun barrels, tools, etc.

Meanwhile crews, either from these tank casualties or from others destroyed in the battlefield, have come back from the "B" trains or TDT to the Corps Personnel Camp (CPC) which is located beside TDS to handle crews. The commander of the Combat Command "B" trains has at his disposal two 3-ton trucks which make a daily run to take crews from "B" trains and from TDT to the fourth echelon stage. It has been found by experience that if normal supply channels are relied upon for this ferrying, there is an excessive delay. When the battle is on and repaired tanks are urgently needed in the front line, it is worth setting aside some trucks for this purpose.

The Corps Personnel Camp is the latest development in this organization and deserves detailed description. When the problem of looking after crews was studied, it became apparent that the proper people to do it were the armored divisions themselves. They already had their own general Personnel Replacement Camps in operation where they held new men coming forward, surplus men from the fighting units during battle, and any others in transit from hospital, going on leave, etc. These camps had a full administrative staff, tents, cooking equipment, and transport provided from divisional resources, and were admirably run. Further, if divisions took over the handling of the crews, there could be no question of the men getting lost or misused, and it would be up to the armored regiments to lend officers and equipment for the benefit of their own crews.

This suggestion was welcomed by the divisions who thus formed their personnel camps, located beside TDS. Though entirely administered and organized by the divisions, these camps are coordinated under a Headquarters, Corps Personnel Camp. The officer in charge is the assistant G-1 from Corps Headquarters and he is responsible, in addition to looking after replacements and men in transit for corps troops, for arranging the moves and siting of the divisional camps, the central canteen and recreation tent, the mobile bath unit, and the central distribution of stores and supplies. A close liaison is maintained between the commanders of the corps and divisional camps and the TDS; but the responsibility for administering, re-equipping, and regrouping crews lies entirely with the divisions who must assure that they always have sufficient crews ready to take over replacement tanks, demanding replace-

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ment personnel, if necessary, through Corps Headquarters.

The principal advantages of this arrangement are that

a. All personnel of whatever category in transit are centralized in one camp. Previously it had been possible for a man to go to TDS, Army Transit Camp, Corps Transit Camp, or Divisional Replacement Camp, and much time could be spent tracing a man through these various installations. Now army delivers replacements direct to the CPC where also all other men in transit necessarily come.

b. Being located in the area of the corps supply dumps where divisional and corps transport meet, the camp is at the natural "junction" where men in transit will arrive and where they may want to stay at least overnight.

c. All resources such as mobile bath units, canteens, mobile movies, etc., can be concentrated. When crews come out of battle and reach the divisional camp, they are met by one of their own officers, given a hot bath, new clothes, new equipment, and excellent food, and have a canteen and recreation tent at their disposal. Such treatment puts them back in fighting form very quickly.

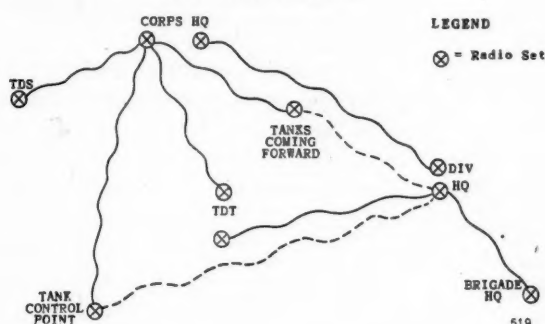
d. A G-1 staff officer is on the spot to deal with the numerous small personnel questions which inevitably arise at Personnel Replacement Centers.

e. Since Headquarters, CPC, is always on the telephone or radio to Corps Headquarters, a staff channel of communication is available to deal with the many varied problems which originate in this busy area, apart from matters of personnel. There are the workshops, the supply dumps and depots, the TDS and many others which can bring their troubles to Headquarters, CPC; for though these various units are themselves in communication with Corps Headquarters, it is often found better for them to discuss their problems personally with a staff officer who can then signal the question to Corps Headquarters in a more pertinent form.

When a repaired tank leaves workshops for the Inspection Unit, TDS are notified, and obtain from Corps Headquarters the priority for delivery, which indeed they would often already have been given. They then tell the appropriate divisional camp, who in turn decide, on orders from Divisional Headquarters, to which regiment the tank is to go, and send one of that regiment's crews over to TDS. The crew take the tank over on arrival at TDS and go round with it as it is being serviced. A similar system of check lists and route instructions to that in TDT is also used in TDS. When three or four tanks are ready, they are sent forward under at least a sergeant and preferably an officer. It has been found better to delay one or two tanks slightly in order to send them with a party under proper command, than to hurry them forward singly and very probably lose them for a period.

The tank party is in radio touch with Divisional Headquarters and TDT, to either of which it may be directed by the division, according to which is most conveniently situated on the route to the armored regiments. At Divisional Headquarters, where there is a Report Center at the entrance to the bivouac, or at TDT, the tanks are re-directed under the same system of orders and control as described above under Tank Delivery Troop. If the distance from TDS to Divisional Headquarters is excessive or across difficult country, corps establishes a Tank Control Point at some convenient location on the main route forward. Here there is an officer who has a radio with which he can be in touch with either TDS and Corps Headquarters, or with TDT

SUGGESTED RADIO NETS
FOR TANK DELIVERY



and Divisional Headquarters. While tanks are coming forward to the command post they are on the former net; but on reporting to it and being sent forward, they flick to the latter net and are then under divisional orders, though still in touch with the command post. Thus the tanks are at all times under close control and can be kept as long as possible on the main route before branching off to division or TDT. They go forward if possible on transporters as far as TDT and thence on their tracks.

The last stage in the organization is that under army and theater. Often there are no 5th echelon workshops under army control, and repairs which are beyond 4th echelon capabilities are sent back to base workshops. Tanks repaired there, or new tanks coming into the country, are sent to the TRG (Tank Reorganization Group) which is under army control. This group contains the Tank Delivery Regiment which services the tanks, the main Inspection Unit which checks them mechanically, and the Reinforcement Squadron which holds a pool of some 1,200 tank personnel from the Base Depot, not yet allocated to specific regiments. When tanks reach TRG, they are checked by the Inspection Unit, small repairs being done in a workshop attached. They are passed over to TDR for servicing and sent forward to TDS either with a small ferry crew or, if replacements have been demanded by corps, with full fighting crews which are then posted to a regiment.

Occasionally, when there are more tanks in TDS than there are crews in the Personnel Camp, such replacement personnel will be sent forward without tanks.

Thus the chain of delivery is completed. The organization described may seem unnecessarily complicated. It may be thought that the replacement tanks and crews which are supposed to be held within the armored regiment will suffice for some time and that thereafter the flow of new tanks and men

will keep pace with losses. In the writer's experience, however, the original replacement pool is very seldom there even at the start of a battle and, if it is, is consumed within the first day. From then on it is a constant struggle to keep regiments up to strength, and the checks and controls described above have only been devised gradually from hard experience to counteract inevitable human failings and weaknesses.

German Tank Tactics

[Translated at the Command and General Staff School from a Russian article by Major P. Slesarev, Soviet Army, in *Krasnaya Zvezda* 18 July 1943.]

OUR OFFENSIVE on the Orel sector of the front is proceeding against stubborn enemy resistance. The Germans try to hold on to every river line, terrain irregularity, and forest. Repeatedly cracks occur in their combat formations which, as a rule, they attempt to seal by the use of tanks. The Germans resort to the use of their armored elements in the defense for two reasons. First, without the support of tanks German infantry loses its firmness to a considerable degree. Secondly, during counterattacks German manpower is so speedily expended that only through the employment of their mechanized forces can they succeed, even temporarily, in restoring a certain balance of power in those sectors of the front where we accomplish breakthroughs.

The Germans largely employ in their counterattacks light and medium tanks of the T-II and T-III types. Frequently, also, they use heavy T-IV's, modernized tanks with reinforced side armor. In spite of the fact that this reinforcing armor plate is as much as 20 millimeters thick, our antitank and divisional artillery, firing at closer ranges than before, continue to pierce the armor and destroy these tanks.

On the Orel sector of the front the main characteristic of German defensive tactics is the comparatively small employment of tanks in mass. Actions by groups of 25 or 30 tanks are typical. In one instance the Germans used 80 tanks all at once, but in a short time our artillery fire hit and destroyed 36 of them and the remaining enemy vehicles, some of which were seriously damaged, hastened to retreat, seeking the protection of German infantry and artillery.

In German tank counterattacks it is rare that their armored vehicles risk advancing more than 300 to 500 meters in front of their infantry. Most frequently they prefer to fire from the average distances of a direct fire. As soon as their echelons find themselves under the massed fire of our artillery, the German tanks immediately turn and run in different directions. This indecision on the part of enemy tank crews, which at times turns into outright cowardice, is caused by the presence on our side of a great quantity of medium and heavy artillery in the immediate vicinity of our infantry.

The echelons of counterattacking German tanks sometimes include a high percentage of the "Tiger" (T-VI) tanks. These latter usually prefer to proceed on one of the flanks of the advancing echelon or at a certain distance behind it and to one side, thus performing the role of self-propelled artillery and at the same time of an armored shield in the event of a sudden flank attack by our tanks. The Germans try to economize in their use of the "Tigers," apparently because they do not have many of them. The T-VI is committed to combat only when it is clear that other German tanks cannot achieve success.

Of considerable interest is the combat formation of German tanks. Usually they appear with heavy tanks in the lead followed by medium tanks, which in turn are followed by light tanks. At the present time, during a counterattack, the Germans most frequently employ various types of tanks in the same echelon, attempting to create the impression of a mass attack on a wide front.

Development of the AAF Logistical System

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IT MAY appear to the casual observer that the Army Air Forces logistical system is a highly complex organism which, like Topsy, "just grew." Some of the factors which led to this apparent complexity and haphazard growth were discussed in an earlier article (MILITARY REVIEW, June 1943). Actually, the problem of logistics as applied to air operations has long engaged some of the best minds in the Air Corps and has been a continuing process of painstaking thought, experimentation, and "trial and error," particularly as awareness developed of the role of air power in modern military operations.

The purpose of this article is to trace the development of the AAF logistical system. This article is not to be considered "historical" in the sense of factual data and dates, but rather a tracing of the various steps and changes as required by the development and expansion of the Air Corps and of aeronautical equipment.

As an initial point, it is necessary to go back to the infancy of our air arm. During World War I, the supply of air units never had a chance to congeal into a standard pattern. The "Aero Squadron" was the only recognized air unit and each was more or less responsible for its own tactics and logistics. Loose groupings of these "Aero Squadrons" were made as the situation demanded. Bombs, ammunition, and fuel requirements, as well as maintenance, were comparatively slight because of the relative simplicity, limited range, and small capacity of the World War I airplane. Another contributing factor was the theory of employment of aircraft—which was then considered to be a sort of third dimensional cavalry. Still another feature was the relatively stabilized warfare in the theaters in which the infant American air arm first tested its wings in combat. Extensive supply and maintenance installations were not required and mobility of ground establishments was of minor importance.

In this connection it is well at the very outset to discuss the question of *mobility*—a very much abused term. Quoting a high ranking Air Corps officer, "Too often mobility has been confused with speed. Many people have fallen into the error of thinking that because the speed of the airplane has advanced to such incredible rates as four and five hundred miles an hour, therefore the effective mobility of an air force is measurable in those speeds. Nothing can be farther from the truth. Military Air Mobility, which must be defined as 'the quality or condition of being movable' is defi-

nately a function of the bases from which the force operates. The tactical radius of operation of aircraft is the determining factor in the ability of Air Forces to reach certain objectives. Within this radius the Air Forces have a degree of mobility in that they are capable of shifting their fire power from one point to another rapidly, but the true mobility of Air Forces in a strategical sense is wholly and completely dependent upon the availability of bases from which they can operate. In this sense the mobility of the Air Forces is identical with the mobility of a fleet.

"As a final word on the subject of *bases*, I would like to correct another erroneous impression. Too often inexperienced people have suggested that the Air Forces are self-sufficient in their ability to establish bases. It is true that the combat aircraft can be flown to a prepared landing field. Supporting Air Transport can also be flown into an advanced area. These transports are capable of carrying personnel and freight but there is a definite limitation, practically and economically, on the quantity of freight and personnel that can be carried. In order to sustain operations for a task force of any size, it is necessary not only to deliver the airplanes and their combat crews but also to deliver vast quantities and heavy tonnage of gasoline, ammunition, and supporting personnel and impedimenta which includes trained technical personnel, tools, machinery, spare parts, and raw materials. The combination of all of these things is a guarantee of success. The absence of any of these vital elements is a guarantee of limited operations."

Due to conditions after World War I, this question of mobility was little considered in the development of the Air Corps. Air organization pro-

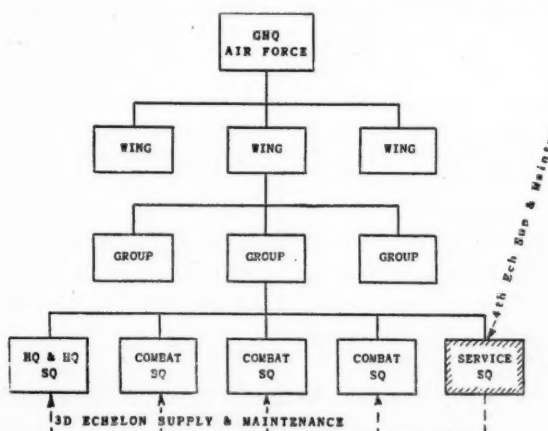


FIGURE 1.

ceeded along classic military lines under which responsibility for supply and maintenance is a direct function of command. We find, then, the old "Aero Squadrons" being organized into Groups, each of which was supposedly self-sufficient insofar as third echelon supply and maintenance was concerned, and into Wings, the latter of which was the largest field unit. An approximation of the organization during this period is shown in Figure 1, which is the set-up existing in 1934.

Air Corps units were operating out of permanent buildings at permanent posts with permanently installed maintenance equipment which had been collected over a period of years. Some of this equipment was improvised and some of it was factory-made, but at this time it was adequate for the maintenance of the very few airplanes on hand. (As late as September, 1939, when the expansion of the Air Corps began, there were, for example, only seventeen Air Corps stations in the continental United States and these were served by four Air Corps Control Depots, at Middletown, Pennsylvania, Fairfield, Ohio, San Antonio, Texas, and Sacramento, California.) The combat units were being serviced by immobile station engineering, supply, and transportation departments together with other permanently installed services. There were no mobile units which could be moved into the field to service the combat units, and very little of the equipment was suitable for field service.

Another factor affecting the logistics problem at this stage of development was the tremendous acceleration in airplane design and performance. The modern, high-speed, long-range, large-capacity airplane had been born, although it is true that it had merely emerged from the shell. A vastly more complicated machine, more intricate tactics and technique requiring closer command control, and increased supply and maintenance requirements made it desirable to relieve the combat air commander completely of the latter two problems.

From 1932 on, the international skies had been rapidly darkening; and realizing that if war came (1) it would be fought in foreign theaters far from our permanent air installations, and (2) the success of our operations would depend first on the success of our supply and maintenance system, the G-4 section of the GHQ Air Force went to work to plan a logistical system that would serve our fighting aircraft under field conditions. This work began from scratch. No data could be found from any country describing a well-planned Air Force logistical system which could be used as a guide. Hence plans were made from the best "educated guesses" obtainable.

As stated before, there were no mobile units which could be moved into the field to service the combat units. Therefore, a mobile organization

had to be designed to take the place of these immobile station organizations.

Figure 2 shows how this was accomplished during the period from 1936 to 1941 by combining the Headquarters and Air Base Squadron (an immobile station complement) and the Service Squadron to form a mobile field organization for third echelon administrative, housekeeping, supply, and maintenance functions.

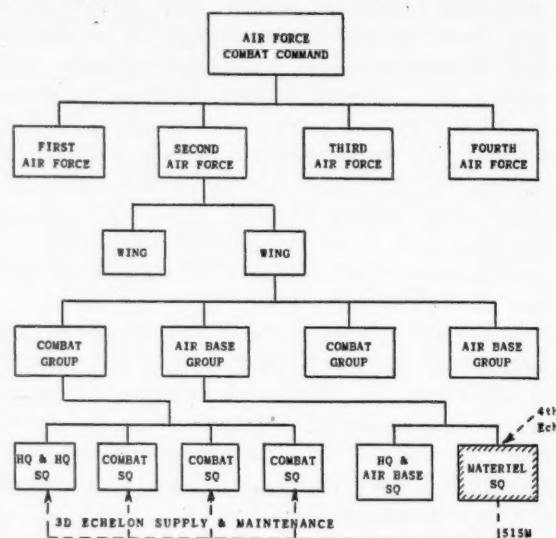


FIGURE 2.

nance functions. It was called the Air Base Group, and by early 1941 one had been activated for each of the stations in the four Air Forces. Augmenting this unit were several other service units from other arms and services—Ordnance, Signal, Quartermaster, and so on.

The Air Base Group was the result of conscientious study and the vivid imagination of officers who realized that this new type of war depended definitely on the efficiency and completeness of a mobile logistical system. These officers had to visualize every requirement to the finest detail and provide a service to fulfil that requirement.

The reorganization of the Army Air Forces on 9 March 1942 saw the end of the old Air Force Combat Command. However, the G-4 Section and the Special Staff of the latter were transferred to Headquarters, AAF, and functioned as the Directorate of Base Services, bringing with them all the logistical plans being developed by the AFCC.

Work had been going on toward the development of a single unit for both 3d and 4th echelon supply and maintenance in overseas theaters, the Air Depot Group. In theory, this unit would operate the Air Force Depot in base areas for 4th echelon; but by leaving behind in the base area its heavy and immobile equipment, it could move to forward areas for 3d echelon supply and maintenance activities. The Air Depot Group consists of a Headquarters and Headquarters Squadron, Supply Squadron, and Repair Squadron, and is further augmented by several

DEVELOPMENT OF THE AAF LOGISTICAL SYSTEM

service organizations from the other arms and services.

It was quickly apparent that no single organization could efficiently perform *either* 3d or 4th echelon supply and maintenance functions, as desirable as this

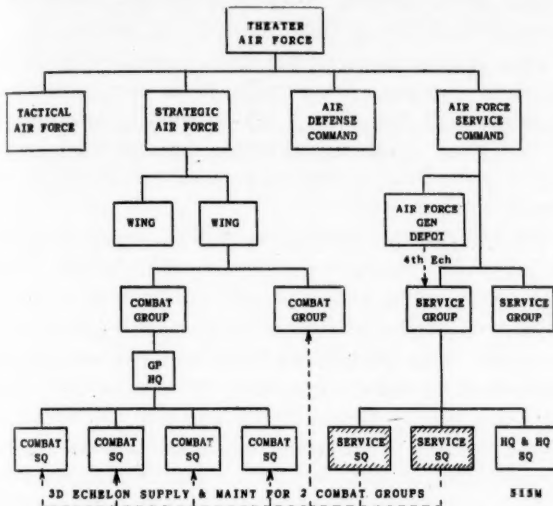


FIGURE 3.

would be. There simply wasn't enough inherent flexibility. Therefore, development of the Air Base Group continued with the idea of making it more adaptable

to field operations. It was renamed the Service Group, the Matériel Squadron was renamed the Service Squadron, equipment and overhead was cut down, and a streamlined outfit capable of operating under the most adverse field conditions emerged. Service Groups were activated on the basis of one per two combat groups, each Service Group consisting of a Headquarters and Headquarters Squadron and two Service Squadrons. Their mission and their place in the logistical plan remained the same as the old Air Base Group, as will be noted from reference to Figure 3, which shows the organization of an Air Force in an overseas theater of operations.*

There were other services, separate from the Service and Depot Groups, needed to complete the logistical system. Some of them were needed only in the event the Ground Forces did not provide them; others were needed in any event. A graphic representation of the AAF logistical organization for the combat zone is shown in Figure 4. It should be particularly

*Since the Service Group was to be a mobile field organization, it was then necessary to activate station complement, or Air Base Headquarters, units to carry on administrative and housekeeping duties at permanent continental United States Air Bases. It was found that this unit was too small for all housekeeping functions, and Air Base Squadrons were reactivated. These two units have since been combined into a Headquarters and Air Base Squadron for permanent station at continental United States Air Bases.

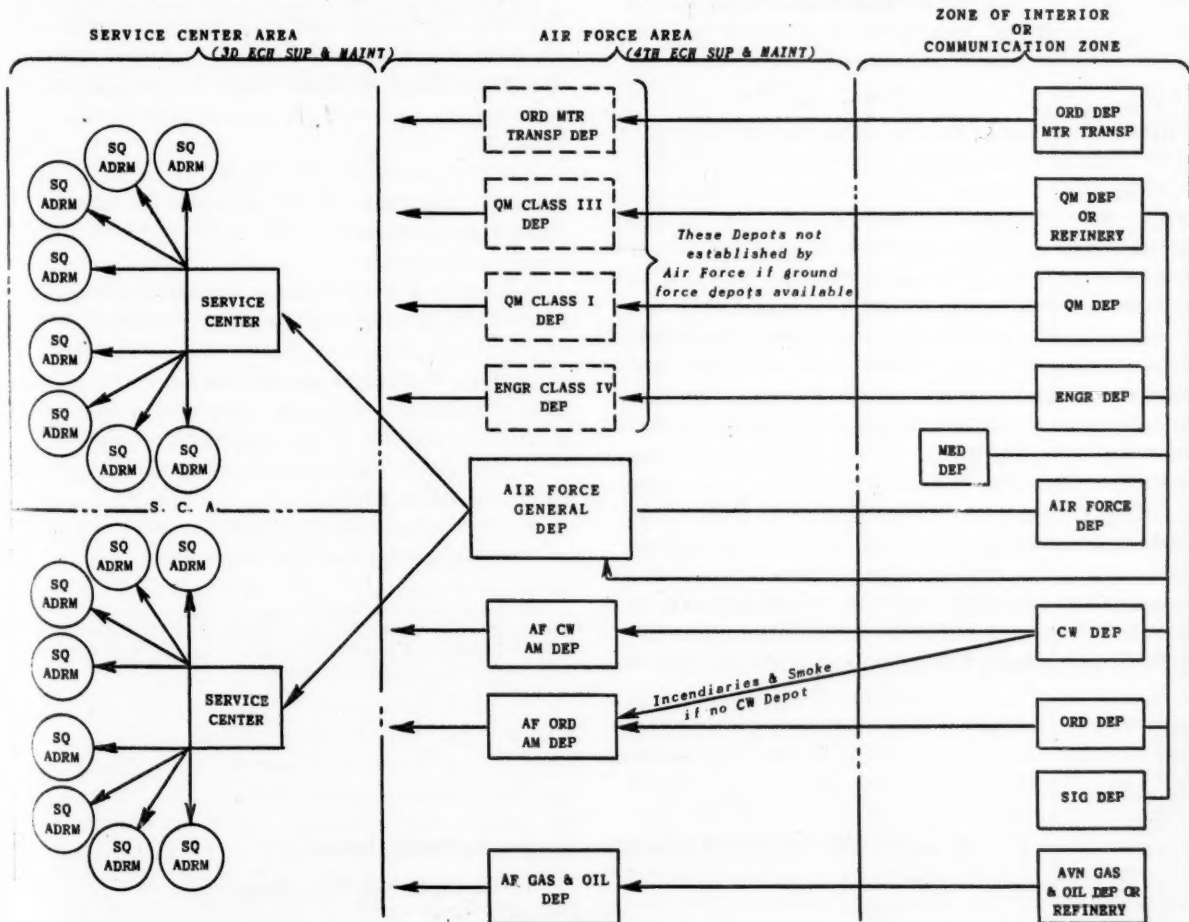


FIGURE 4.

emphasized that Air Force units draw on Ground Force establishments to the maximum extent possible, setting up Air Force establishments only when the ground forces cannot, for distance or other reasons, supply their needs.

The Air Service Command, which was discussed in an earlier article (MILITARY REVIEW, June 1943), has been responsible for the organization, training, and equipping of the service units, and furnishing them to overseas Air Forces as required. The Air Service Command is also responsible for equipping the combat units and for seeing that aeronautical supplies and equipment reach the units overseas at the right time, at the right place, and in the right amount.

Supplying an Air Force operation is a business—in fact *Big Business*. The reader might consider, for example, that as much as two tank cars of gasoline and a freight car of bombs may be required to load a single squadron of Flying Fortresses for a single bombing mission.

The months of combat behind us have forced an ever-increasing awareness upon the units of the AAF of the vital importance of logistics to air operations and of the fatal consequences of any breakdown or constriction in the flow of supply. In some of our overseas theaters today, the A-3 cannot plan operations until the A-4 has accumulated—sometimes in the face of nearly insurmountable obstacles—the necessary supplies at the forward airdromes.

Fortunately, as we gain experience from combat in widely separated theaters, as American industry produces at higher and higher speed, and as shipping difficulties are overcome, the AAF logistical system becomes ever stronger and more capable of supporting any tactical operation. Most important of all, though, is the increasing awareness on the part of all concerned that it is impossible to separate strategy, tactics, and logistics; all are complementary parts of the whole—*success in battle*. It is no longer possible to complain, as did a report of several months ago: "Starting December 9th, practically every squadron in the United States was moved from some to another place; and from that day to this, their original equipment has never caught up with them. The work of two years was undone within a few days by the stroke of a hysterical pen. Operations officers still appear to be entirely oblivious of the problem of packing and moving supplies. Activation and training plans are changed and organizations are moved

from place to place without ever coordinating in advance with the supply sections of their staff. The supply officer is at the mercy of the operations officer. The change of an operation may alter the entire supply plan; therefore, the operations officer and the supply officer should work very closely together." The author would change "should" to "must."

This, briefly, has been the development of the AAF logistical system. Admittedly it is not perfect—there are still "bugs" in it which must be eliminated by trial and error, imagination and enthusiasm—but it is the first in the entire history of the AAF. And it works!

What of the future? This writer hesitates to "stick his neck out" with any predictions. This much, however, seems to be evident—(1) the system just described was designed for and works particularly well in mobile, fast-moving warfare and where combat squadrons are widely dispersed; (2) where Air Force units are highly concentrated and are not moving from airdrome to airdrome, closer control over supply and maintenance by the combat commander is possible and perhaps desirable; (3) in situations such as (2), perhaps we shall see a reversion to something approximating the set-up shown in Figure 1.

In conclusion, the reader is asked to consider these few items:

1. The logistical system discussed was designed for field operations in foreign theaters. (Refer to MILITARY REVIEW, June 1943, for a discussion of AAF supply and maintenance in continental United States.)
2. There was neither historical background nor foreign experience in air operations, tactical and logistical, upon which an AAF logistical system could be designed.
3. The AAF have expanded something like 4,000% since 1939, calling for a constant upward revision of logistical plans.
4. Each theater of operations (and changing tactical situations within the theater as well) requires a different solution of the logistical problem.
5. The AAF logistical system must not be considered fixed or static.*
6. *No strategical or tactical operation can succeed without adequate logistical support.*

*Even as this is written, word is received of a plan for the reorganization of the Service Group along the lines of the Air Depot Group. Its place and function in the logistical system will, however, remain the same.

It is not sufficient to kill Russians. One has to knock them over.

—Frederick the Great

Engagement of a British Field Battery in Tunisia

The spirit of this battery in its desperate struggle to the end demands the greatest admiration. The action described took place in February 1943. Permission to publish the report which contained the following account was only recently obtained.—THE EDITOR

SIDI N. was a detached locality in the hills of Tunisia. The force located there consisted of an infantry battalion and a field battery. Its object was to gain time. It was attacked by German forces including a number of Mk VI ("Tiger") tanks and elements of armored divisions.

At 0630, F Troop came under fire from mortars and engaged them with artillery fire. From this moment on until dark, F Troop, and to a lesser degree E Troop and the command posts, cooks' shelters, etc., were under increasingly heavy mortar fire.

At 0715 enemy tanks made a direct attack down the road. F Troop engaged them, No. 1 gun knocking out a "Tiger" tank at 300 yards range with armor-piercing shot. Three rounds of armor-piercing tracer were seen to enter the turret just by the junction of the gun and turret. The tank, which had been firing at the 25-pounder, immediately went out of action.

Lorry-borne infantry were observed moving into position on the southern flank of the battery behind one of the many hills which surrounded the gun position, and at 0940 the observation post was heavily attacked by infantry. Communications were broken. The radio was smashed by mortars and the line cut. From this moment on the battery had but secondary eyes overlooking the road.

At 1015, when the commanding officer visited the gun position, F Troop was under observation at a range of about 800 yards. The track leading down to the command post was under very heavy and very accurate mortar fire, rounds falling every three seconds or so. The commanding officer was full of admiration for the cheerful and determined courage of all ranks. While on the position he experienced one of the several cannon attacks by eight Messerschmitts. They attacked from a height of about 200 feet and raked the gun positions with machine-gun and cannon fire. A number of men were hit; the ammunition vehicles, bivouac shelters, and dumps were set on fire. A number of vehicles were burning along the road, some of them filled with ammunition and ammunal, but the risks were ignored by all ranks who cheerfully salvaged and carried the ammunition throughout the action. The wounded acted stoically; none grumbled or complained. They were attacked again and again by Messerschmitts.

The commanding officer left the position at 1145 under orders of the commander of the infantry brigade.

By 1240, enemy tanks (reported to be thirty in number) and infantry had worked into positions around the flanks of the gun position. From captured maps it is also clear that self-propelled guns were being moved into position at close range, about 600 yards. All this time the battery was engaging enemy infantry, machine guns, mortars, etc., which were closing in on the positions occupied by our infantry.

The opinion has been expressed that from a tactical point of view it might have paid to have kept all eight guns playing at a range of 1,200 to 2,000 yards in enfilade on the heavy columns of tanks and vehicles cluttering the road. This, however, would have resulted in the battery being unable to take on infantry and mortars attacking our own infantry. In fact, the battery placed first the protection of the infantry of which it was in support.

At 1145 the gun position came under further small-arms fire at close range.

At 1500 a column of enemy infantry penetrated between B echelon and the gun positions, and no more ammunition could pass.

At about 1520 more tanks advanced down the road under covering fire from some thirteen tanks in hull-down position firing guns and machine guns. A "Tiger" tank was leading. This was holed three times in the turret by No. 1 gun. A Mark IV tried to pass the "Tiger" but the Mark IV was hit immediately and the "Tiger" got stuck when trying to back. A third tank behind was set on fire, and a fourth was knocked out twenty yards from the gun muzzle. One gunner remarked: "I knew for certain they were all out of action. The one twenty yards from the gun muzzle had wounded in it, and the crews dragged one man away in front of my nose, and me without a rifle!"

The enemy tanks in hull-down position had a great advantage over our guns. They engaged the guns one by one, set fire to ammunition dumps, killed the detachments, and smashed up the guns.

At 1600 an attack from the road again developed against the southern flank of F Troop. No. 1 gun smashed up the leading tank but directly afterwards the entire crew was killed by a direct hit. The tanks then came over the ridge and on to F Troop's position. Three guns were still in action and these engaged the enemy at ranges from fifty to ten yards, with one officer, the batman, cooks, and all survivors running from gun to gun and servicing each in turn.

F Troop was silenced by approximately 1730. The

tanks smothered the gun positions with their gun and machine-gun fire. Any man who moved was immediately shot, tracer ammunition being used. Some of the tanks went around the position, swivelling on their tracks and crushing in the slit trenches. The tanks then went down the road between F Troop and E Troop and surrounded E Troop.

At 1751 the last message came by radio, "Tanks are on us," followed a few seconds later by the single letter "V" tapped out in Morse. At about 1830, as it grew dark, Bren guns and at least one gun of E Troop were seen to be still in action against the enemy tanks at ranges of ten to twenty yards.

When the battle began there were nine officers and 121 men of other ranks at the gun positions, com-

mand posts, and observation posts. Of these, nine survived the action, two being wounded and now in hospital. A tenth officer, from regimental headquarters, is missing since leaving B echelon to visit the gun positions.

This account has dealt in particular with the action of the field battery, but the magnificent stand of the infantry battalion and the field battery must be considered as a whole. Men of the infantry battalion paid tribute to the gallantry and devotion to duty of all ranks of the battery. Men of the battery cannot say too much of the courage and grit of B and D Companies of the infantry battalion who held out gallantly throughout the day in an effort to keep the enemy at arm's length from the guns.

Helicopter and Autogiro

[From an article in *United States Naval Institute Proceedings* September 1943, reprinted from the *Baltimore Evening Sun* 7 July.]

ALTHOUGH both the helicopter and Autogiro are commonly referred to as "flying windmills" and look somewhat alike, the two types are different in both principle and operation.

The Autogiro, first to be developed, has both the whirring horizontal windmill blades above the fuselage and a propeller in the nose like the orthodox airplane. The helicopter, however, has only the windmill blades whirring horizontally above it. It has no propeller in the nose but does have a small propeller in the tail of the ship.

In the helicopter the rotor blades are driven by a motor and these blades act both as wings and propeller. In the Autogiro, the horizontal blades merely act as the wings of the plane and these blades are turned by the flow of air driven by the forward propeller. The Autogiro has the conventional controls in the tail of the ship but in the helicopter the rear propeller acts as a torque control and rudder.

In operation, the Autogiro is pulled forward by the propeller in the nose of the plane. As the Autogiro goes forward, the motion through the air turns the horizontal rotor blades. These blades develop lift and the plane rises. As long as the Autogiro moves at an air speed of 30 miles an hour there is enough rotor speed and air flow to keep the Autogiro up. When the air speed drops, the Autogiro goes down. Unlike the Autogiro, the helicopter's big horizontal rotors are driven by the plane's motor. The motor turns the

rotor blades so that enough air flows across them to maintain lift and keep the plane up.

This is why the helicopter can practically "park" in the air over one spot. It does not need forward motion either to turn its rotor or provide air flow. This also explains why the helicopter can fly straight up or straight down. The rotor blades of the helicopter also drive it through the air. This is accomplished by varying the pitch of the blades to get motion in any direction—even backward. The little rotor on the tail of the helicopter serves as a rudder and offsets the tendency of the craft to revolve in the direction opposite to that in which the big rotor is turning.

Helicopters are now being built for the United States Army and tests have been successfully completed in which helicopters take off and land on merchant ships. All the helicopter needs for a landing field is a space 40 feet square. Its speed varies from 75 to 110 miles an hour. By substituting pontoons for wheels, the helicopter becomes an amphibious craft. Since it needs no forward ground motion to take off and land, the helicopter can come down on either land or water with the pontoon landing gear.

Several aircraft plants are already building helicopters and several more have given indications that they will enter the field with new designs. And while the public is becoming acquainted with the helicopter, *Webster's Dictionary* recommends the pronunciation "hell-i-copter"; not "heel-i-copter."



MILITARY NOTES AROUND THE WORLD



GERMANY

German Claims for the "Trackcycle":

The difficulty of getting vehicles to the eastern front through almost impassable mud led to the development of the trackcycle shown in the accompanying picture. The vehicle's motor and running gear



are so well protected that it can be driven through water .44 of a meter [over 17 inches] deep. It has a 1.5-liter 36-horsepower Opel-Olympia motor, cooled by a blowing apparatus which meets requirements no matter how slowly or rapidly the vehicle is driven. It has a dual steering system; when the handle bars are turned slightly to right or left only the front wheel functions for steering, but when they are moved farther, steering brakes take hold giving the two tracks different speeds depending on the amount of braking. The trackcycle can turn in a circle the diameter of which is its own length, three meters. It can be driven at a walking pace or at the top speed of a motorcycle. It is useful not only for messengers passing over trackless terrain to the front, but as a tractor for dragging logs, bogged guns and vehicles, etc., and also as a transport for heavy supplies. It served as well in the sands of North Africa as in the mud, snow, and ice of Russia.

(From *Motor Schau*, Berlin, Germany,
April-May-June 1943)

Guard Towers in Forest Regions:

Numerous heavy forests in Russia, many of which

are swampy, lend themselves ideally to guerrilla operations.

Since these forests frequently lie within their main lines of defense, the Germans find it necessary to keep constant vigil lest Russian guerrillas penetrate behind their positions and disrupt their organization. The forests are so dense that it is impossible to control the whole terrain without constant, close observation. To facilitate the latter the Germans have been erecting watch towers in the forests, using native lumber for this purpose.

The towers are erected at about 300-meter intervals. They are made tall enough to overlook the surrounding terrain. On the bottom floor of the tower there is a bunker where men live, while an observer is placed on the top floor. He is armed with a machine gun which he uses in case of necessity. Around the tower log barricades are constructed for all-around defense.

(*Hamburger Fremdenblatt*)

A "Jumping Laboratory":

German parachute forces are provided with a hygienic and bacteriological field laboratory which, together with its attendant personnel, accompanies them on their jumps into hostile territory.



In the photograph above the case in which the laboratory is packed is being pulled out of an un-

favorable position in which it has been dropped by parachute.

Carried to a suitable location, the box is opened and the commander of the team, who is a medical captain, and his assistants begin their researches. Their principal duty is to test drinking water in the operational area. If the water is found to have been rendered unusable by chemical or other means, the springs or wells are so marked and the friendly



forces are immediately notified by radio. The second photograph shows two of the laboratory team testing water with their portable equipment. The work of these jumping scientists, according to the German account, has proved of great importance to the fighting forces.

(*Die Wehrmacht*, 4 August 1943)

GREAT BRITAIN

Air Service to Moscow:

A frequent, through air service between Great Britain and Moscow is being operated by British Overseas Airways. The route is flown in three-and-a-half days, including a 24-hour stop in Cairo, and is by way of North Africa, Cairo, Habbanieh, Pahlevi (Iran), Astrakhan, and Kuibishev. Passengers travel through to Moscow in the same aeroplane, believed to be a four-motor landplane. Government officials and urgent freight are carried.

(*The Aeroplane*, Great Britain, 23 July 1943)

Land Mine Detectors:

Land mine detectors in the hands of sappers played a large part in clearing the Axis out of North Africa.

The detector consists of a box containing two electrical coils set in tropical wax. The box is attached to the end of a long bamboo pole and is connected through an amplifier to a pair of headphones. When tuned in, current passes continually through the coils which send out magnetic waves over a short distance. The nearness of a metal object, such as a mine, causes an interruption to the magnetic waves and the result is a high-pitched noise through the headphones. This warns the listener that he is treading dangerous ground. The detectors are delicate instruments, but the search coil can stand up to fairly rough handling, and if anything should go wrong with one particular part it can be immediately replaced by a similar part without having to repair the entire machine.

(*The Tank*, Great Britain, August 1943)

HUNGARY

Fire Director:

The "Gama Juhasz" AA fire director (instrument functioning in a linear manner, calculates the polar coordinates automatically) is also used in Switzerland and Sweden. Originally, Switzerland introduced the American Sperry instrument but by 1939 this could no longer be obtained. According to the experience gained in Switzerland the Hungarian instrument is equal in quality to the American.

(*Wehrtechnische Monatshefte* April 1943)

ITALY

The Italian Navy:

As a result of the Italian surrender, the Allies came into possession of the following units of the Italian fleet:

Battleships, six: *Italia*, *Vittorio Veneto*, (both at Alexandria); *Caio Duilio*, *Andrea Doria*, *Giulio Cesare* (all believed to be at Malta); *Conte di Cavour* (under repair at Taranto).

Cruisers, eight.

Destroyers, twenty-seven.

Submarines, nineteen.

Torpedo boats, corvettes, minelayers, minesweepers, auxiliary craft, etc., about forty-eight to fifty.

Utilization of the newly acquired naval vessels involves considerable difficulty due to the different types and calibers of their ammunition, fuses, and fire control mechanisms. The reliability of their crews is also questioned.

(*New York Times*, 17 September 1943)

JAPAN

Populations Under Japanese Rule:

It is estimated that over 430,000,000 people are

MILITARY NOTES AROUND THE WORLD

now ruled by Japan. These people are divided as follows:

Japan	72,000,000
Occupied China	150,000,000
Netherlands Indies	68,000,000
Manchuria	41,000,000
Korea	23,000,000
Indo-China	23,000,000
Philippines	16,000,000
Burma	16,000,000
Thailand	14,000,000
Formosa	5,000,000
Malaya	5,000,000
Total	433,000,000

(*The Changing Far East*, Foreign Policy Association Headline Series, August 1943)

SWEDEN

Air Defense:

The air defense of Sweden is under an air protection command which has set up special groups for civilian air protection.

The 2.5-cm antiaircraft cannon L/64 Bofors has a barrel 1.6 meters long. Elevation field, -5° to $+90^{\circ}$, lateral field, 360° . Six shells are held in a clip. With the 0.25 kilogram shell at an initial velocity of 870 meters per second, a height of 3,000 meters and a maximum range of 4,500 meters are reached. Fire speed theoretically 170, practically, 95 rounds per minute. The gun weighs 1020 kilograms in firing position.

(*Artilleristische Rundschau* March 1943)

SWITZERLAND

New Field Gun:

The 12-cm cannon of the Swiss Army is replaced by the 10.5-cm cannon M 35. This gun, manufactured by the Bofors Company, has a two-beam limber [split-trail?] with elevation field of -5° to $+43^{\circ}$ and a lateral field of 60° . Shell weight, 13.5 kilograms. With an initial velocity of 785 meters per second, a maximum range of 17,000 meters is attained. Weight, 3,750 kilograms. The "Saurer 6 M" serves as prime mover.

Armored Car Armed with Cannon:

The light armored car (length, 5 meters; width, 2 meters; height, 2.4 meters; weight, 10 tons), developing up to 40 kilometers per hour with its 125 horsepower motor, carries in the revolving turret a machine gun and a 2.4-cm cannon, and another machine

gun in the forward wall. The armor is up to 22 millimeters thick.

(*Artilleristische Rundschau* March 1943)

UNITED NATIONS

Gliders vs. Fighters:

There is an impression that a loaded glider is a soft touch for a marauding fighter. This is not the case. In fact, a fighter pilot inexperienced in dealing with gliders may get a shock. The glider pilot, when attacked, cuts loose immediately from the towplane, kicks up the spoilers on top of the wings, and drops almost vertically before the fighter can line his sights on his victim. Turning and twisting, the glider gets down on the ground in a few minutes, and its heavily armed and efficient load of troops makes strafing a risky business for the attacking plane.

(*Canadian Aviation*)

Gliders Picked Up from the Air:

The Allies have developed a method of picking up a loaded glider without landing the towplane. A tow-rope attached to the glider is looped over two poles about five feet high and fifteen feet apart. The towplane is equipped with a large revolving reel, heavy cable, grappling hook, and automatic brake. As the plane swoops low over the uprights, the hook grabs the towcord. The rope, made of nylon, is allowed to run out at constant tension to lessen the shock and in a few seconds the glider is air-borne.

(*Canadian Aviation*)

German Radios Compared with those of Allies:

Captured signal equipment of the German Army is heavy and complicated and not up to the standards of the apparatus used by the Allies. This statement is made on the authority of two officers of the Royal Signals (Great Britain) who are touring the Middle East with a mobile exhibition of British and American signal equipment, with a representative collection of German equipment for comparison. "We get very much better results with far simpler gear," one of the officers said. "We are now using an increasing amount of American and Canadian-built equipment as well as sets both designed and made in the United States and we have found everything exceedingly good. The American twelve-line telephone exchange is exceptionally fine and is one of the few that will continue to function in a sandstorm. Most of the captured German equipment was designed and made before the war—some of it as long ago as 1936." Among the radio sets demonstrated is one weighing twenty-three pounds, of very robust construction, for parachute troops, and the American "Walkee-Talkee" which weighs only six pounds with batteries and has a range of a mile.

(*The Tank*, Great Britain, August 1943)

U. S. S. R.

Suvorov Military Schools:

Planning at once to care for children of Soviet military personnel and those orphaned by the war, and to create cadres of highly trained officers of the Russian Army in the future, the Soviet Government has decreed the creation of a number of military schools named after the great Russian military leader of the Eighteenth Century, Field Marshal Suvorov.

These schools are intended for children of Russian military personnel and guerrillas, and the children of civilians killed by the Germans in occupied Soviet territory.

For the present it is planned to admit 4,500 children to the Suvorov Military Schools to be opened in Maikop, Novocherkassk, Astrakhan, Voronezh, Chuguyev, Kursk, Yelets, Kalinin, and Stavropol.

The curriculum will include the studies of civilian elementary and secondary schools with certain changes, such as the compulsory study of one foreign language throughout the course. Considerable attention will be devoted to military studies and physical training and to the inculcation of Suvorov's rigid Spartan principles of military virtues. Uniform worn by the pupils will be closely patterned on that of the Red Army.

Since, admittedly, the Suvorov Military Schools are to be patterned after the old Cadet Schools of Imperial Russia, it is presumed that the course of study will cover eight years, starting at the age of eight or nine.

Graduates of the Suvorov Military Schools will be further trained in the officers' schools and eventually commissioned in the Red Army.

(*Krasnaya Zvezda*)

UNITED STATES

A Flying Schoolhouse:

Instruction for heavy bomber students is now being provided in a four-engined Boeing bomber which has been arranged as a flying schoolhouse. The craft is identical with the Flying Fortresses except that its armament has been removed and its fixtures renovated to provide room for classes. A regular crew of instructors is in charge of the training program, and the schoolhouse flies to various centers where heavy bomber students are given systematic instruction in securing the highest possible operating efficiency and maximum flight range by coordinating

a multiplicity of factors such as fuel mixture, air speed, turbo-supercharger, pressure, engine speed, and altitude. The students also learn how to act in difficult circumstances as when, for example, one or more of the engines is crippled in the course of a bombing mission.

(*Scientific American* October 1943)

The Army's Amphibian Truck:

This amphibian truck, popularly known as "the duck," has a six-wheel drive for use on land and a propeller in the rear for use in the water where the revolution of the wheels may also be used to aid propulsion. "Ducks" appeared in action for the first time in the invasion of Sicily, and General Montgomery rode in one of these vehicles on a tour of towns captured in the early stages of that operation.

(Picture from *Illustrated London News*)

New Bayonet:

American combat units on all battle fronts are now being supplied with a shorter, lighter, and sturdier bayonet by the Ordnance Department. Strategic materials saved through development of the new bayonet total 362 tons of high-carbon steel from estimated 1943 production and 560 tons from the forecast of 1944 production.

The blade of the bayonet has been shortened from sixteen to ten inches, its weight reduced considerably, and its battle use improved. The new bayonet, like the old one, is flat or sword-like in appearance. It may be used as a trench knife, is easy to handle, and has been especially welcomed by jungle fighters, paratroops, and airborne infantry.

(*Army Ordnance*)

FOREIGN MILITARY DIGESTS

German Paratroops at the Foot of Aetna

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article by Hans-Georg Schnitzer, war reporter, in *Völkischer Beobachter*, Berlin, Germany, 16 August 1943.]

AS WE FLY on our way toward the south a few hours after the alert signal, the main question that occupies our minds is whether we will land or whether we are to jump.

One has to be a paratrooper to understand the feeling that we call "jumping fever." Hence the animation is great when at the first intermediate stop we receive the order to get ready to jump. We now wrap the bandages around our feet, put on our knee protectors, check our weapons once again, and carefully distribute the contents of our pockets, not for the purpose of balance but in order to know later exactly where to grab for the hand grenades, the first aid kit, and above all, for our cigarettes.

The discussion of the operation takes us into the dining room of the airport along with our transport crews. The group commander gives exact orders for the approach, landing point, height at which the jump is to be made, and the take off. There then resounds over the broad field the order which has a very special significance to the paratroopers: "To the aircraft!"

From the dust and roar of the flying field, we again rise into the sky, assemble in group columns, and in close formations start on our way to Sicily. Flying past the smoking crater of Vesuvius, we take our departure from continental Europe, and look ahead until another volcano, Aetna, shows up out of the hot glare of the flashing sea on the other side of the Strait of Messina. From its base rises the smoke of burning cities and villages. We see one great bomb crater after another along the highways. Many things seem to be awaiting us here! But we have no more time for reverie. We hear the order, "Get ready! We put on our steel helmets, rise to our feet, and make the release cord ready. Again we hear the order, "Ready to jump!" The first man steps into the open port. Pressed close together, we stand breast to back. "Out!" In a few seconds the plane is empty. Hundreds of parachute troops are floating down to Sicily. By the time the first have reached the ground, flight after flight and group after group of planes are,

roaring in. The plain alongside a railway line is filled with the roar of motors—until finally the air becomes quiet.

A few hours later we have reached the area designated to us. We are to take over the left sector of the front, along the sea. We receive our baptism of fire in Sicily from naval artillery and low flying planes. Aside from that the enemy leaves us alone the first day. But he makes up for it in the night. We are just changing our position when we observe small dark objects moving toward the land from under the defensive fire of an enemy naval formation which is cruising off the shore and which is being attacked by German fighter planes.

Scarcely are the assault troops under way to meet this threat to our flank by the hostile landing boats when a low humming sound causes us to look upward. We see shadows detaching themselves from the dark silhouette of a plane, shadows which we know only too well—paratroops. While machine after machine unloads this dangerous freight over our heads we prepare for defense in all directions. The night is filled with many short but violent battles. When morning dawns we have not slept a wink, but we have put out of action not only the enemy forces who landed by boat but also those arriving by parachute. However, at the same time, the enemy, because of superiority in tanks and heavy weapons, has succeeded in breaking into our position on the right. Since he has also made landings to the rear of us, we, along with our regiment, are completely surrounded. We have no heavy weapons of any sort and are faced with the danger of being run down by enemy tanks when daylight comes. Now it is up to us to act quickly. The commander of the regiment, Lieutenant Colonel Heilmann, decides to break his way through the enemy's lines during the night. When the moon rises the whole regiment starts off in a file formation to effect a breakthrough. Marching silently, we move back through the coastal plain, expecting to be attacked by the enemy at any moment. But hour after hour passes without a shot being fired. When, at about 0400, we pass through a canyon-like gorge and come out into a valley, the cry suddenly comes from up ahead, "Enemy tanks!" Like a flash the leading company rushes up onto the railway embankment to the left of the highway. The whole column comes to a halt. Finally, a tense silence settles over us. Then we can hear the whole valley filled with the rattle of numberless tank

tracks. The enemy's route of advance is 800 meters away from us. Since the sun must soon rise and because of the heavy massing of enemy forces, we cannot risk a breakthrough. The commander decides to hide the regiment under the dense foliage of an orange grove until dawn. When the sun rises we learn just what our situation is. From the buildings belonging to the grove we are able to observe that we are located in an enclosed valley, that the enemy is occupying the hills around us, and that only 150 meters from us in the adjoining grove there is an English encampment.

To be ready for all emergencies, we dig in in the soft earth under the trees. Yet we have not entirely escaped the eyes of the enemy. Probably he has caught sight of our water carriers, for on two occasions we are fired on. However, he apparently believes us to be only a few stragglers unworthy of action of any considerable magnitude. Twice our hopes of getting out of this circular valley sink almost to the zero point. For every time that things get quiet we again think that we are discovered, and the enemy would need to call on only a few of the tanks that have been rolling over the highway the whole day long in order to run us out. Although during the long night we have brought along our weapon containers and some 70 prisoners, we know that we will have to leave all behind for the coming night as they will hinder our movements. We therefore bury our weapon containers, radio apparatus, and everything else that we cannot carry. The prisoners are left behind in the orange grove buildings under the guard of a slightly wounded man.

The main problem for the second night of the breakthrough is how to get across the route of advance. We plan to attempt to slip through under some viaduct-like bridges without being detected by the bridge guards. We wade a river whose water is breast deep, then start off in the direction of the bridge. The leading battalion and the regimental headquarters are already on the other side when we are suddenly fired on from above. Now there is just one chance for us, and that is to escape over the highway. Our whole battalion, under the fire of a tank which is just coming up onto the bridge, again plunges into the river, and rushes up the slope on the other side and across the highway before other tanks have time to block our way. Then we wheel to the right and dive down again into the gorge. While we hurry along, part of the time under cover of a dense growth of rushes and brush, part of the time in the open in the moonlight, the enemy keeps firing down on us from armored scouting cars. However, most of the time he fires too high. Finally he loses our trail as we turn off into an adjoining gorge which leads us up onto a barren mountain ridge. On the other side we march along a railway track, assemble at a deserted railway station, and a few minutes later make our way into a tunnel some two kilometers in

length. Here the seconds seem like minutes to us as we stumble along with burning feet and in complete darkness over the ballast, ties, switches, and great pieces of rock. Finally, when we are again out in the open, the report comes back from up ahead that we are not yet through the enemy's lines. Again we are obliged to hurry as fast as possible so as to be able to hide before daylight arrives. At the edge of a former German flying field the regiment slips down into a ditch filled with a growth of rushes. The headquarters personnel occupy the tents of the ground personnel which are camouflaged as straw stacks. We remain here until the night again passes, for enemy tanks and armored scouting cars are rolling past not far from us. Once a few of our men who had carelessly ventured as far as a house are fired on. Again we think we have been discovered and that we will soon be attacked by larger forces, but the night comes on again without our being further hindered in our advance.

In the rear of our fire-spitting front we make our way across the coastal plain toward the mountains. And we are led so skilfully on this trip that the first shot we hear is that of a German sentry. Our first thought after crossing our own line is to get some sleep. Our legs dragging with weariness, we drop to the ground under the trees of an orange hedge. Only on the next day in the rest camp, when hour after hour more of our scattered comrades, who have been breaking their way through alone, join us, do we give vent to our joy over the success of our operation and our happiness in seeing one another again. A few kilometers behind the main line of defense the divisional commander, Lieutenant General Heidrich, congratulates us in a regimental assembly. Then once more Lieutenant Colonel Heilmann steps out in front of us and draws the conclusion from the events of the last few days: "There is no situation so hopeless that it cannot be mastered by bold action." With this in mind, the regiment returns to the battle.

The Aviation Commander in Combat

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Russian article by Lieutenant Colonel N. Denisov, Soviet Army, in *Krasnaya Zvezda* 3 October 1942.]

SUCCESS in combat depends much on the skill of the commander in correctly selecting a place for himself from which it is most convenient to guide the activities of his subordinates. This situation applies to all kinds of troops, including aviation. To be sure, it is applicable to aviation only with the consideration of a very important detail: the commander has to direct combat both in the air and from the ground. When the commander of a fighter unit is on the ground, he does not directly take part in the combat. At times he may not even see how the battle is developing, a thing which is absolutely

unthinkable, for example, for the commander of an infantry regiment. However, even on the ground he can influence the course of activities developing in the air. In the first place, his will is expressed in the combat order which the fliers are carrying out. In the second place, using radio, he can follow the course of combat from the ground, put new forces into action, give orders for withdrawal from battle, and so on. For commanders of bomber and attack air units these possibilities are still greater.

In aviation it is necessary to count on the presence of these two possible variants of combat command: from the ground and in the air. Which of these variants is more expedient? The decision here depends on a multitude of factors. First of all it is necessary to keep in mind the branch to which the given commander belongs. The commander of a large air unit is one thing, the commander of a smaller unit or escadrille is another. The character of the task and its importance also has significance. It is necessary, in addition, to consider such a factor as the degree of preparedness of the flying personnel departing for a combat flight. One thing is incontestable: the possibilities of direct influence on the course of combat activities from the ground are always limited. For this reason many aviation commanders, called upon to guide directly the activities of their subordinates in combat, must accomplish command largely in the air.

Thus the question of the place of command, on the ground or in the air, must not be approached superficially. It is self-evident that any air unit, having been assigned its combat mission, fulfills that mission even in case the commander is not along. But very often the commander's personal participation in the battle is a basic prerequisite of success.

In one instance fifteen light bombers took off from one airdrome of the western front. Captain Menyaev, commander of the unit, remained on the ground. After some time five planes returned. This group had encountered a very complicated situation. In the area of its activities the fire of hostile antiaircraft gunners was especially dense. Here, besides the boldness of the crews, still greater skill was needed, and, in particular, experience in maneuver against hostile antiaircraft. The leader of this group had not handled his problem adequately. Hearing his report, the commander decided to await the landing of the other planes. Upon their return a number of other details of the situation became clear, such as frequent encounters with hostile fighters and deteriorating weather in the area of the objectives.

The leader returned from this mission not without some success, but from the unit as a whole incomparably more was demanded. It was cooperating with ground troops, and already at the very beginning of the action this cooperation broke down. It was necessary to correct the situation. The ground troops needed immediate assistance from the air.

Captain Menyaev organized a second flight, changing the route and elevation of flight somewhat. The same officer was designated as the leader, the commander again staying on the ground. The second flight also could not be considered satisfactory. Only on the third run did the unit successfully accomplish its mission.

Did the commander act correctly in remaining on the ground both times? Several very important circumstances connected with the ground service, the preparation of equipment, and the working out of further actions demanded the presence of the commander on the field. Thus it is possible in the first instance that he remained because of extreme necessity, although he must have known how tense was the situation in the air. As to the second time, it seems that there cannot be two opinions. For the air commander engaged in cooperation with ground units there is nothing more important than the interests of the general combat. The commander's duty was to head the unit personally on the second flight, no matter how urgent matters at the field. Everything indicated that the situation called for great skill and the mastery of a leader. How could the commander calmly stay on the ground when he knew that the results of the first flight were unsatisfactory? In each individual instance the situation dictates where the commander should be: in the air, on the field, or at an observation post of the higher commander. It is necessary to remember that, being in the air all the time, the air commander may turn into a line pilot, and on the other hand, by directing all combat from the ground he ceases to be an air fighter. But the role of the air commander who, having lost his function as a flier, ceases to be an air fighter is unenviable.

Can the commander of fighters have absolute authority among his pilots if he does not lead them into the battle himself? He cannot! But does this mean that he must go up in the air at every air alarm signal? Not at all. Only the situation in each individual case prompts the correct decision.

The commander of a bomber or assault regiment should approach his job in this manner: If the regiment is engaged in a single massed thrust, the place of the commander is in one of the active groups of aircraft. While in the air he will command the whole combat formation by radio. In case the situation becomes complex, he will at once make a decision, lead the planes to the objective, and strike it. If the work of the bombers or assault planes is planned so that they fall on the enemy in echelon, in small groups, then quite possibly it is more expedient for the commander to stay on the ground. Being at the field, he will direct the flights of the units, striving for the continuity of their action against the enemy.

The air commander organizing a flight must decide for himself where he should be. The one who correctly combines the duties of both the commander

and the flier acts in the interest of the battle as a whole. Wherever this commander may be, in the air, on the ground, or in the combat formations of ground troops, his unit must always feel firm leadership and unswerving direction, especially in decisive stages of the battle.

Improving Artillery Observation

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article by Captain Lehmann in *Artilleristische Rundschau* July 1943.]

ACCORDING to the principles laid down in Army Regulations the battalion commander is responsible for the choice of observation posts, but attention is also called to the fact that it is the duty of every artillery commander to improve the condition of observation. The following example, from the summer campaign of 1941 in Russia, illustrates the success that can be achieved by shifting an observation post as the result of a decision by the battery commander.

In July 1941 a division from lower Saxony was west of Zhlobin (not on sketch) warding off attacks by Russians from the Dnieper bridgehead. After a series of engagements which were very costly for both sides, the enemy occupied positions facing our regiment about as shown in Figure 1. Positions of

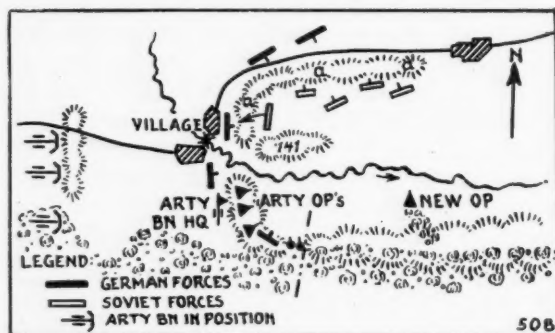


FIGURE 1.

the enemy north of Hill 141 could not be observed from the German side since they were covered on the north and west by a rise, "a," and on the south and southwest by Hill 141. From these well-organized positions the enemy attacked frequently and violently in a westerly direction. He finally succeeded in capturing the village north of the small stream.

On account of the topography, artillery support of our own defense and attacks was possible only through employment of advanced observers. In order to get away from the crowded condition of the observation posts on the hill south of the stream and to increase the effectiveness of his fire, the commander of the right battery decided to seek a more suitable observation post for his own use. He found a favorable place between our own forces and the regiment about two kilometers to our right. From the tip of a narrow strip of woods in an elevated position, it was

possible to look down on the flank and rear of the enemy north of Hill 141. It was also possible to get a good view of traffic into and out of the positions and to obtain a view of the enemy's supply routes and installations. The place had two disadvantages, however—longer connections and lack of protection by one's own infantry. The observation post was transferred to this new location upon the battery commander's decision, sanctioned afterward by the battalion commander. At the battery commander's request the position of the right company of the infantry battalion was extended to the east, and a group was attached to the battery as a securing force for the observation post. Organization of the post was carried out at night with great caution and speed (see Figure 2). A communications trench was dug clear to

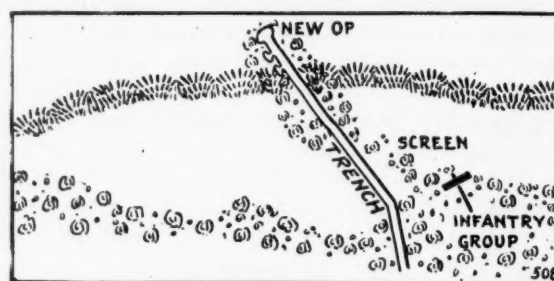


FIGURE 2.

the tip of the strip of woods, which measured only ten meters across and consisted of a dense growth of pines about four meters high. Holes were dug for the observer, the telephones, and the messenger. All excavations were carefully camouflaged. The position was secured against surprise attacks by means of trip wires connected with hand grenades and booby mines. The division quickly learned of the favorable position and the improved observational possibilities of the new post, and it was visited by many commanders and general staff officers who desired to observe the terrain and the habits of the enemy. In order to escape the danger of discovery by the enemy, the connecting trench was extended far into the sparse growth of tall trees; and a screen was constructed of sixty pine trees some three or four meters in height.

Effects obtained through the use of this observation post soon resulted in considerable relief for the infantry. By means of the battalion's concentrated fire laid down on the Soviet positions north of Hill 141, it was possible to break up all preparations for attack by the enemy; and it was also possible to recapture the village north of the small stream. Three enemy batteries were destroyed by means of observed fire, two others were forced to change their positions, and an enemy ammunition dump was discovered and set on fire by artillery shells.

And so the decision of the battery commander bore its fruits and laid the foundation for successful defense of the division and for its later attacks.

Mobile Columns

[Digested at the Command and General Staff School, Fort Leavenworth, Kansas, from an article by Major Ripley Webb, M.C., Indian Army, in the *Army Quarterly* (Great Britain) May 1943.]

IN WESTERN EUROPE we are likely to see operations against what the Prime Minister has called the "soft underbelly" of the Axis together possibly with a more direct assault. Sooner or later there will be operations in Burma and the Far East. In any of these theaters of war there will be from time to time a demand for self-contained columns, hard-hitting, fast-moving, and often forming part of an elastic system of penetration of enemy territory that does not favor a general advance on a broad front, or alternatively for cooperation in a general advance by a rapid occupation of strategic points or destruction of enemy communications.

Whatever type of operations we envisage there will arise a need for columns of fighting troops able to travel far and fast, and if necessary to fight to attain their objective without prospect of immediate support. It will therefore be of value to consider how and to what extent such columns can be organized, trained, and employed.

The organization of the column will be dependent upon the nature of the country. In open country, where enemy armor may be expected, the column will probably comprise a core of artillery with medium tanks and mobile infantry to exploit and protect its action. In enclosed country lack of observation may rob the guns of some of their value, while in mountainous country the howitzer alone is of real use while tanks lose their mobility. The column organization must therefore be flexible.

In the employment of mobile columns dispersion will be the dominant factor. Everything will be stretched to its utmost—control, communications, support, supply, and maintenance. To counteract this a high degree of initiative, self-reliance, and efficiency will be demanded from the more junior leaders, while grouping of formations and units must be flexible as training and ingenuity can make it. Success will depend upon speed and determination, both in thought and action, which will in turn depend upon practical experience and training to the point of weariness in such matters as march discipline and vehicle maintenance.

General Montgomery has emphasized that the maneuvering of big forces must be conditioned by the air situation. Yet it is probable that under certain conditions direct air support, especially at the outset, may once again be attenuated. Airdromes will, in the opening stages, be few and far between, and fighters will be restricted by distance. So in our training we shall do well to rely upon carefully planned passive air defense rather than upon a large measure of direct air support.

As regards the organization of a self-contained column, everything will of course depend upon the terrain. It may be an armored column in the truest sense of the term, with armored cars, medium tanks, self-propelled guns and other hard-hitting elements, backed up by infantry in armored vehicles. Such a column would be capable of thrusting far ahead of an advancing army and seizing points of paramount importance or destroying the communications of the forces attacked. The Russians have developed this technique with great success. In such a case the column might be formed from components of an armored division. It seems that each case must be judged on its merits, and no hard and fast rules can be made as regards organizations. Odd things happen. For example, tanks have their uses in mountain warfare while infantry may turn the scale in the desert. The tactical handling in either case will be very different but the principles of organization and employment will be similar. Whether the striking power lies in armor or infantry, it is very desirable that an existing formation headquarters should be utilized for the means of command and control of the larger columns. Improvised headquarters, lacking such essentials as signals, clerical staff, etc., are never satisfactory. With a mobile column operating on an attenuated line of communications it will be even more necessary to have every possible assistance in control and administration.

On the other hand it will be found that actual command while on the move must be exercised on the simplest possible system. It is at the head of the column that things will happen, and here that decisions must be taken that should not be delegated to a subordinate officer. The column commander who waits for information to come back to him will soon find himself in trouble. Of all things he himself must be a go-getter.

Remembering the length of our column, anything up to thirty or forty miles, we must be very careful in arranging the order of march for the day. Once the march has started this order can rarely be altered. On the information available at the time and the object to be attained, the commander must decide just what type of weapons he wants near the head of his column. It may be artillery, it may be Army Track, it may be explosives. In any case it will nearly always be advantageous to have some guns very near the head. It will be his aim to keep away from the head of the column every vehicle that is redundant.

Traffic control is of paramount importance in such maneuvers and the units responsible for this comprehensive duty must be versatile in their accomplishments. They must be able to sort out hopeless looking jams, sidetrack refugees, shepherd lost vehicles and units, and be traveling encyclopedias of information. Only the best of personnel should be selected for this work and the training must be wholly imaginative. It is easy to miss turnings when using ill-

defined tracks and a posse of traffic control men should always be near the head of the column so that men can be dropped to indicate the route, or otherwise mark it. Cohesion will be found another difficulty. If march discipline is not good, units or detachments will become separated. On one occasion a battalion commander sailed away in Italian territory under the impression that he had a whole battalion and a troop of artillery following him. In reality he was backed by no more than ten lorryloads of troops. The remainder had not seen the signal to advance.

Next the loads. An officer deputed to command such a column will be wise to consider the prospects and in certain cases see whether he cannot leave behind some of his equipment or administrative details, either at a depot or to be sent on later. Our column will have to carry far more petrol, water, ammunition, and food than normal loads allow for, so that either some equipment must be left behind or extra vehicles provided. Every added lorry means more exposure to the air and more petrol, etc., to be taken. Theoretical planning is not enough, only practical experience will show what is essential and what is redundant.

Communications will always be difficult and maps often at fault or nonexistent. The training should include much work on strange country without maps. Wireless still leaves something to be desired in wooded or mountainous country. A high ridge can cut communication completely between low-powered sets while tropical country often provides the unexpected in the way of "blind spots" in which neither transmission nor reception is possible. In this type of warfare the liaison officer will often prove the most reliable means of communication for important orders and information.

Adequate reconnaissance is essential to a swift-moving attenuated column with its long, vulnerable flanks. In the mountains air reports are apt to be misleading not only concerning enemy movements but topographically. The accustomed sectional elevation from the viewpoint of ground troops is turned to plan when seen by the pilot, and as anyone who has had experience of this type of country will know, features can be reported quite differently by ground and air. The tricks that can be played upon you by false crests and under features that are almost invisible until you reach them, have to be experienced to be believed.

The quality of the leader is more than ever of importance in this advance of long-tailed columns. In the leader of today we look for a vivid sense of imagination controlled by cold reason. This is well exemplified in General Montgomery's handling of the North African offensive. When we look at the bleak prospect that must have faced him at El Alamein, and at the same time realize that to reach the culminating success at Tripoli, each step of that forward move with its intricate administrative planning must

have been foreseen and allowed for, it is clear that he must have used his imagination to the full. There are many examples earlier in this war where events showed that we failed to use any imagination at all. It is equally fatal to let our imagination run away with us as it appears Hitler did in his disastrous Caucasian adventure. But controlled by reason it can be a wonderful servant and a valuable reconnoitering unit. Imagination can form a beam which will pierce the fog of war and operate behind the enemy's lines, laying the foundations for subsequent advance.

Our column commander, then, must use his imagination freely. He must know his country and be able to assess the value of the reports he receives. He will learn, too, to gauge the nature of the opposition he encounters. Nothing is more mortifying than to discover too late that a handful of men with a few automatics and a pack gun have been holding up your column and forcing it to deploy. Only experience based on careful training will obviate this. The leaders of such columns will find themselves acting on the barest of orders. It is desirable, therefore, that the superior commander should get to know his column leaders far better than would be necessary in ordinary operations. He must know their capabilities while they must know his mind, his object, his ideas on its attainment. They must know too his resources, the nature of the support they may expect in given circumstances. But above all they must know their airmen.

Good leadership will be dependent upon a good intelligence system. In no campaign has intelligence proved of such paramount importance as in the Western Desert. Mobile columns will again and again be employed to fight for information or to obtain it from far behind the enemy's forward positions. In a modern war of fast movement and unexpected situations there is no time for leisurely weighing up of considerations. Intelligence regarding enemy locations, equipment, morale, leadership, and organization, together with topographical knowledge, must be collated and minutely examined before an operation, and deductions must be prepared beforehand. These will of course be amended as reports come in, but when you consider the conflicting factors of type of country related to enemy organization, enemy morale related to obstacles, enemy equipment related to our own equipment, and then speed everything up to sudden unexpectedness, it is easy to see that during operations there is no time for pondering over pro's and con's. It must all be ready beforehand, for never was there more need for the staff to be able to provide immediate and potted information of this kind for a commander who is called upon to take a quick decision upon which may depend success or failure of at least a part of his superior commander's plan. A "tankable" map will be prepared of course as soon as the probable theater of operations is known. Shaded areas will show country impassable to ar-

mored fighting vehicles and the tactical implications of this factor will then stand out in immediate relief.

We now have some data upon which the training of troops likely to be employed in mobile columns may be based. Other factors will occur to the mind of the officer planning the training. Much attention is now being paid to battle training including the crossing of water obstacles.

There is no doubt that our pre-war training lost much from our tendency to use set-piece schemes designed to bring out stereotyped lessons. It was rare indeed that the unexpected happened or that junior commanders were faced with sudden dire emergencies. We are learning now that we cannot have too much imagination in our training. Especially will this be the case with columns of the type we are considering.

The mobile fighting column may be employed on various occasions. In the assaults upon Kursk, Kharkov, and Stalingrad, the Russians used such columns far behind the battle front to interrupt the enemy's communications and to aid in masking the point where the real threat was to develop. The value of modern armor lies largely in its ability to strike at any unexpected point by reason of its great mobility. It is therefore relatively easy on a wide front in suitable terrain, to pierce the front at some unexpected point sufficiently to let an armored column through. This column, operating in conjunction with a major assault in the neighborhood, can then profit by the general tie-up of reserves and accomplish its mission. It will be bounded by its limit of self-sufficiency which can be increased by raiding enemy depots or by an air supply system as the Germans did when invading Poland. In this way the enemy can be forestalled upon an objective, kept guessing as to the direction of an attack, or weakened by losses and severing of communications, never so important as during a major operation. Thus his mind becomes confused and his morale shaken. Though the German is stubborn in defense and is not easy to dislocate, once that dislocation is complete he finds it difficult to regain cohesion. This is an attribute worthy of exploitation and the mobile column provides the means. It is a weapon with which the enemy's arteries can be severed at a critical moment, while its use is obvious after a major defeat has been inflicted upon the enemy at a time when our own administration is strained, armored formations are not available, and major forces cannot be got on the move sufficiently rapidly to interfere with his withdrawal at that fleeting moment when it can be turned into a rout. The mobile column may make all the difference but it must be ready, it must be trained and prepared and equipped for its task.

It is not suggested that there should be special troops for this duty. There are no great difficulties nor unusual demands upon the troops. But there are a great many details that need training and exper-

ience if undue delay and less efficiency are to be avoided. It must not be thought that such columns as these are to be limited to the role of strong offensive patrols which can fight for information or perform other tasks contributory to, but subordinate to, the main effort. Such an armored column will be *part* of the main effort as the operations in Russia have shown. Communications and equipment have become so vital to the modern army that its defeat is not only to be obtained through an assault on its main positions. To strike at its communications and at the same time envelop the main force, as a prelude to more leisurely reduction with the aid of heavy artillery, has been found a much more economical method.

These are some of the factors that are going to influence our tactics during the remaining campaigns of this war, with the emphasis upon the striking power of the offensive column. The main essentials of such a column are cohesion and mobility giving the power to punch hard, made possible by a high degree of skill in maintenance and road discipline, together with the ability to travel hard and light, careful organization in accordance with the nature of the task considered in relation to the terrain, the go-getter instinct implanted in every one, good reconnaissance, sound intelligence and power of deduction, with a high degree of initiative, the whole being parmented by training and experience. The experience may be limited to what can be obtained in local conditions in training areas but practical experience there must be. It will be realized that we are assembling a machine every whit as dependent upon its components as is the aircraft moving in the fourth dimension. If one component is weak the efficiency of the whole is threatened. So that, given the leadership of such a column, a commander will be wise to set about his task on the lines indicated, never satisfied until he has trained and tested his troops in every likely capacity nor until he has built up that spirit of a corporate body which will be his standby when the last ounce of punch is needed to bring him success.

German Tank Tactics in Russia

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Russian article by Lieutenant Colonel M. Zubkov, Soviet Army, in *Krasnaya Zvezda* 20 April 1943.]

FROM the very start of the war, the German command has tried to use tank units in mass for the execution of deep penetrations. Right up to the winter of 1941-42, wherever the Germans operated, the action of all types of troops was attuned to what the armored forces did. Tanks fought in a compact mass and were not used for infantry support. This does not mean that tanks fought without infantry, but infantry was motorized; it was the tanks' own infantry.

Great German losses on the Soviet front caused its

infantry to weaken even in the winter of 1941-42, and it was unable to carry out any tasks independently. Then, contrary to its own doctrine, the German command began to attach small numbers of tanks to infantry divisions. These tanks were to clear the path for the infantry.

In the winter of 1942-43, after suffering great defeats, the Germans began to disperse their tanks still more, attaching them to large infantry units. Masses of tanks hitherto gathered in a compact group were dissipated. At some places, for example at Stalingrad, the Germans tried to accomplish something intermediate: they organized offensive armored groups which quickly shifted to the threatened sector of the front. But, at any rate, we did not see any massed use of tanks by the enemy prior to his counterattacks in the Ukraine.

Toward the end of the second year of war the Germans not only had abandoned their previous organization of tank units, but even introduced tanks into the organization of their motorized regiments.

The highest unit of the German armored force is the tank army. The smallest unit capable of performing operative tasks is the armored division. The Germans use tank divisions for the accomplishment of the following missions: breakthrough of a protective screen; prompt occupation of decisive sectors and points important for further conduct of fighting; sudden attack on moving units; attack on a sector not completely prepared for defense; attack along a narrow front on a prepared defense. The chief task of the tanks is the development and exploitation of success in the defensive rear and in the area of operation.

Attacks are usually undertaken by tank regiments consisting of about 200 tanks, according to their tables of organization. They operate in mass, organizing combat formations in two or three echelons. If a tank regiment attacks in two echelons, the first is made up of two tank battalions; the second, of one. The second echelon follows the first and has the task of developing the former's success. Antitank artillery advances with the second echelon.

As formerly, the tanks during attack carry on intensive fire intended primarily for psychological effect and are accompanied by planes which try to pin the defenders down. For this purpose hostile planes endeavor to remain over the battlefield as long as possible. They do not drop their bombs all at once, but at intervals. Between these bombings the planes dive and strafe with their machine guns.

Our units have frequently encountered all these enemy methods and have taken necessary measures for repulsing massed tank attacks. These measures include, first of all, massing and deep echeloning of antitank weapons (primarily artillery), and secondly, utilization both of mobile antitank reserves for combating hostile tanks which have broken through

and of strong tactical reserves for combating German motorized troops.

For successful repulse of massed enemy tank attacks, reconnaissance is of great importance. It must determine exactly where the enemy is assembling for the attack. It is important to anticipate the German plan and make preparations for the encounter in that sector where the enemy intends to accomplish the breakthrough. For this purpose it is essential to follow attentively the tactical regroupings and concentrations of the enemy troops with the aid of all means of reconnaissance.

The Germans try to inflict blows on the flanks and at junctions of our units. As soon as a concentration of tanks is noticed it is necessary immediately to undertake corresponding measures. A whole system of antitank-defense strongpoints with fire organized on the basis of mutual support must be prepared in the threatened sector. For mutual security of flanks, antitank-defense strongpoints should be echeloned in depth. This results in the creation of firepockets into which hostile tanks fall and are subject to fire from two sides.

It should be emphasized that, in all cases, successful repulse of hostile tank attacks depends entirely on the stubbornness and firmness of our troops. In the German army all sorts of troops are used for supporting the tanks. If the defenders, disregarding enemy aviation, concentrate all available fire on the tanks and cut off the infantry with rifle and machine-gun fire, then the enemy attack will surely fail. During a tank attack, under no circumstances should fire be diverted or part of the infantry shifted for action against the planes supporting the tanks. This is the job of the antiaircraft artillerymen and the fighter planes. For artillery, antitank rifles, and mortars, there is only one objective—the tanks. However thickly German planes circle above them, antitank elements must concentrate only on tanks.

Recent battles have demonstrated that our units know from the beginning how to crack and smash German tank wedges. Good reconnaissance and detailed aerial photography, repeated several times, always disclose where the enemy intends to deliver his tank thrust. After this becomes known, it is necessary to act with precision and speed. In organizing antitank strongpoints it is necessary to take all precautions in guarding against flanking maneuvers by hostile tanks.

It is possible, of course, that the enemy will not be successfully stopped at the forward edge. In this case he must be absolutely ground down and destroyed by our units in the defensive rear. Energetic and violent counterattacks by mobile antitank reserves against the flanks of the enemy who have broken through will lead to the desired result.

It must be observed that, having suffered defeat, combat organization of the German armored division breaks down very quickly. In order to compen-

sate for the lost forces, the Germans attach some units of the defeated division to another armored division or even to infantry units.

In defense the Germans likewise assign an important role to their tanks, using them in small groups in close cooperation with infantry and other types of troops. These groups are intended for counterattack. But it should be said that when they encounter the antitank artillery accompanying our attacking infantry, enemy tanks usually roll back as soon as the foremost machines are hit. The Germans try to counterattack against the flanks.

Some of the damaged and non-repairable tanks are dug into the earth by the defending enemy and are used as immobile pill boxes. It is best to outflank such positions, but if this is impossible then they must be destroyed by artillery fire or isolated like ordinary log and earth dugouts.

The Germans sometimes try to solve defense problems by attacking, delivering diversionary counterthrusts with the purpose of reducing pressure in the sector of decisive importance. Here they do not break up their tank units at all but use them as a whole. Similarly, they do not break up tank units in holding engagements or in protecting the flanks of large forces engaged on a wide front.

It is necessary to combat this in various ways. Against tank counterattacks the same measures are employed as in an enemy attack. Hostile tanks protecting the flanks and wide intervals in their front line must be outflanked by our mobile antitank groups. It is impossible to set a standard procedure for this. The situation itself will dictate what is necessary. In other cases it is advantageous even to attack the enemy tank division deployed on a wide front. It is sufficient to filter through its combat formations and cut its components off from the rear and from transport; in a short time the matériel possessed by the enemy will prove to be but dead freight.

Smoke-Trail Mortars

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article by Kugelen, war reporter, in *Münchener Neueste Nachrichten*, Munich, Germany, 31 July—1 August 1943. Photographs from *Die Wehrmacht* 4 August 1943.]

FRONT fighters and those in the homeland know, at least in a general way, what a "Stalin's organ" or a "salvo cannon" is; but there are, for the most part, only rumors and false ideas current in Germany with regard to a weapon which is far superior to this Russian copy.

Units of the smoke-screen-layer forces are organized into regiments which are fully motorized, are capable of traveling off highways and roads, and are highly mobile. They are equipped with smoke-trail mortars of medium, heavy, and extra-heavy caliber. As is the case with artillery, the regiment is subdivided

into battalions and batteries. Being a decisive arm, these regiments are concentrated at points of hardest fighting on the front and, on account of their extraordinary fire power, are a vital factor in the hands of the commander. The fire power of these mortars is made clear by the fact that a salvo from nine medium batteries corresponds to a salvo from 81 heavy field howitzer batteries. Organization and equipment, with communication apparatus and motor vehicles, are similar to those of a motorized artillery regiment. Since these mortars are usually close behind the infantry front line, batteries are also supplied with antitank cannon. On account of the light construction of the mortars, a 3-ton tractor suffices for pulling them. This tractor carries both crew and part of the ammunition.

The mortar is a six-barreled weapon (see Figure 1), the six barrels being mounted around a central axis or in two layers on a light carriage. Made of light sheet steel, the barrels serve only for pointing and guiding the projectiles. All other complicated parts about a gun, such as the tube made of the best steel, breech mechanism, recoil brake, pneumatic counter-recoil mechanism, and heavy carriage, are absent in the case of this modern weapon whose peculiarity lies in a special method of propelling the projectile. Thus, a weapon weighing from 7 to 16 *Zentner* [about 770 to 1760 pounds] depending on the caliber, combines the fire power of six heavy field howitzers each of which weighs 120 *Zentner* [13,200 pounds]. This modern weapon is, therefore, very mobile and particularly suited for quick action with tank and motorized divisions. By means of electric ignition, the six projectiles are fired within the space of a few seconds. While in the case of the Soviet "salvo guns" the stabilization of the projectiles is obtained only by means of vanes and therefore considerable dispersion occurs when the wind is blowing, in the case of our mortar a rotation about the longitudinal axis, that is, a twist, is attained. Hence the shots group themselves over a very small area of the target.

While at the beginning of the campaign in the east the black powder that was employed left great trails of smoke behind the projectiles and a lofty wall of smoke was produced in front of the battery (see Figure 2), the smokeless powder now used leaves only a slight trail; and only a red glow marks the path of the shell. Any one who has witnessed night firing of the mortars with their trails of fire, or by day has heard the howling and whistling of hundreds of fiery projectiles within a few seconds, will never forget the impression made by it. And when the salvo crashes down onto the enemy with flash and thunderous roar, the heart of every infantryman beats harder; for he knows that where the salvo struck there is no life left.

The mortars fire three kinds of projectiles:

1. Explosive shells, among them shells with highly



FIGURE 1.

SMOKE-TRAIL MORTAR BATTERY. CREWS RUSH FORWARD TO RELOAD AFTER SALVO HAS BEEN FIRED.

sensitive and delayed-action fuses which make it possible for the shell to destroy protective covers. First of all, the explosive projectiles are intended for anti-personnel purposes by means of their fragments and mine effect. Without external wounds, whole groups

the infantry attacks. In the defense, the laying of a smoke screen makes it easier to disengage from the enemy and prevents losses. It has often been possible, by neutralizing the enemy's antitank weapons by means of a smoke screen, for our tanks to cross difficult terrain which was under fire.



FIGURE 2.

THE PROJECTILE CAN BE CLEARLY SEEN IN FLIGHT.

of the enemy have often been found dead from the effects of the fearful explosion of massed volleys of heavy-caliber shells, and even field fortifications and bunkers have been caused to collapse and their crews have been destroyed.

2. Flame shells, which by their frightful jet of flame and smoke produce a strong psychological and moral effect on the enemy and inflict severe burns. Houses go up in flames, and under favorable circumstances woods and fields are set on fire.

3. Smoke shells which, shot over the enemy as a wall or zone of smoke, deprive him of vision and therefore of the opportunity to employ aimed fire. By this means a great deal of blood is saved when

The smoke-trail mortar forces, in accordance with their task of destroying the enemy by means of concentrated fire, are employed in units of a battalion or regiment in strength. By means of proper establishment of the batteries, well planned communications system, and numerous observation posts with advanced observers with the infantry, great flexibility and rapid concentration of fire power on the most important targets are assured. For operations far into the enemy's positions, for breaking up assemblies for attack, for knocking out command centers, or for effectively breaking up sudden attacks, the mortars are brought far to the front, almost always ahead of the artillery. In their firing positions, which are built after the manner of supporting points, they are a strong support for infantry which is engaged ahead; and many an attempted breakthrough by the enemy during the winter months collapsed in the face of direct fire of smoke-trail mortar batteries.

Air Reconnaissance

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Russian article by Major General I. Vinogradov, Soviet Army, in *Krasnaya Zvezda* 4 July 1943.]

IN THE present war of maneuver, air reconnaissance has a special role among other types of recon-

naissance. It is the most important means by which to gather data about enemy concentrations and intentions. The enemy often uses misinformation to conceal his plans and to lead our troops into error. In such cases the data of other types of reconnaissance can be checked by air reconnaissance not only before battle but also during all its stages.

The importance of air reconnaissance is especially great in offensive combat. It usually gives a sufficiently full picture of the system of enemy defense, obtained by continuously photographing the defense zone. In the course of attack air reconnaissance constantly observes the approach of hostile reserves and the areas of their concentration. Often it alone is able to determine the start of the enemy's retreat which begins with the movement of rear installations and trains concealed from ground observers. During pursuit, air observation discloses retreat routes of main and secondary enemy concentrations and the positions which he prepares for organized resistance.

Air reconnaissance also gives invaluable service in difficult battles when liaison between the higher staff and the units is disrupted. Information steadily comes in from air scouts about the course of combat in various sectors of the front and about the position of hostile troops.

Air reconnaissance can be divided into long distance or operational and local or tactical. Long distance reconnaissance usually proceeds in the interests of the general front or army command. Local reconnaissance acts to a depth of 40 to 50 kilometers or, during battle, directly over the battlefield. For the latter not only special scout planes are used but also all combat air craft. Let us examine briefly what demands are placed on air reconnaissance in battle, and what factors sometimes hinder fulfilment of these demands.

Air reconnaissance attains its objective only when it is carried on constantly, day and night, both on the battlefield and in the rear. Unfortunately, it cannot be said that this rule is observed everywhere. Sometimes because of bad planning of reconnaissance and incorrect calculation of its forces and means, actions of the enemy for a long time escape the attention of the higher commander. Absence of constant observation of the enemy leads to reconnaissance not being carried to completion. It sometimes happens that the scout reports movement of a column but cannot indicate its destination. Sometimes the region of concentration is also successfully determined, but there is no further observation of the column, and it is uncertain whether it is there at the given time or has gone to another region.

It is necessary to attain constant observation of areas of concentration of large groups or columns of the enemy, especially tank and motorized. This does not mean, of course, that the scout plane must follow the column all the time. Continuity of reconnaissance is attained by repeated flights, both day

and night. These flights are provided in the staff plan of air reconnaissance of the force of combined arms. It is also desirable that local reconnaissance planes literally "hang" above the battlefield. Continually observing all that goes on on the ground, the flier must perceive the slightest changes in actions of the enemy and in the movement of his reserves. When enemy counteraction is strong, fighter planes can be engaged for this task.

Accuracy and reliability of air observation data is of great importance. Practice shows that there still are deficiencies even in this sphere. We have encountered such facts as these: the air scout reports an observed column by radio, frequently orally, without saying anything about its composition. He notices the column but cannot say whether it includes artillery, tanks, or motorized infantry. Or the scout says that on some stream line there are a certain number of hostile crossings. As to their nature, whether they are small assault bridges or ponton bridges, he is unable to say. Of course such data do not give the higher command a clear picture, and prevent determining exactly what is going on within the enemy dispositions.

In order that air reconnaissance data be correct and reliable, the scout must be persistent in his observation and must skilfully evaluate the actions of enemy troops according to various symptoms. Hence the conclusion: cadres of air scouts must consist of officers with high tactical training and knowledge of the organization and tactics of enemy troops. It is desirable to have in the air reconnaissance units some crews with wide experience. They may be entrusted with the most responsible tasks: for instance, checking especially important information received from ground and air reconnaissance.

The most reliable picture of the disposition of hostile troops in the defense zone and fortified areas is provided by air photographs. Absolutely inadmissible is the disregard prevailing in some quarters as to this most valuable form of air reconnaissance. True, at times such underestimation of air photographs is produced by their extremely prolonged and incomplete deciphering in air staffs. It is necessary to attain speedy and precise work by the photograph-reading personnel, and it is especially important that at the time of preparation for attack the commanders and units engaged in the main effort should receive photographs or large-scale maps showing the system of enemy defense in the given sector.

Prompt reporting is essential, especially during combat when the aerial observer communicates in the clear by radio about everything observed. His data are received simultaneously by the air and higher headquarters, sometimes including the division staff. It may happen that not all headquarters have stations for the reception of air reconnaissance data. In this case, and also when the scout discovers something very important, it is necessary, besides report-

ing by radio, to throw small pennants [dropped messages?] to staffs of units and columns of troops moving to the battlefield.

To all that has been said it is necessary to add that success of air reconnaissance largely depends on how correctly higher headquarters assigns problems. The air staff sometimes receives too general a task: to reconnoiter such-and-such a region. There is no doubt that reconnaissance will not produce satisfactory results in this case. It is necessary to give more concrete directions, pointing out what to reconnoiter and when. On a certain sector, the forward edge of German defense along the whole front was successfully photographed. Positions to a depth of ten kilometers and also the supposed second defense line of the enemy were photographed. Air reconnaissance proceeded uninterruptedly by day and night, with the result that the shift of German reserves from a depth of up to 250 kilometers was successfully determined. Air reconnaissance data and interrogation of prisoners showed that the Germans did not have reserves in this sector, and air photographs revealed the strong and weak places of hostile defense, which helped the command to choose correctly the direction of the main blow. Three days before the attack, commanders of regiments and battalions engaged in the main effort received photo-maps.

Our units successfully broke through the German defense, and mobile troops streamed through the breakthrough. About a day later air reconnaissance reported that the enemy had begun to shift troops from his left flank to the place of breakthrough. It was clear that the German command, not having reserves, was weakening its left flank. The unit stationed there confirmed this fact by ground reconnaissance, and a blow was inflicted on the newly formed weak spot. Soon the whole concentration of hostile troops fell into a deep pocket and began to retreat in disorder, abandoning a mass of equipment.

Systematic day and night air reconnaissance then disclosed the routes of the German retreat and the concentrations of men and equipment. This gave our aviation a chance to inflict a number of crushing blows on enemy troops and communications, while the ground command was helped in correctly organizing pursuit. It may be confidently asserted that in this victory much credit was due to the air scouts, and also to the combat planes which, while fulfilling their immediate missions, constantly informed the ground command as to everything noticed in the enemy camp.

Defense of Inhabited Places

[An extract from an article translated at the Command and General Staff School, Fort Leavenworth, Kansas, from the *Revista Militar* (Argentina) July 1943. The article appeared in that magazine as a translation (probably from German) of an article by Majors Greiner and Nebe.]

INHABITED places provide considerable protection

against attacks by armored vehicles. Therefore the defender, on finding nothing in front of his position which will afford absolute protection against tanks, such as, for example, a wide river, will always make a great effort to occupy inhabited places which are inside his position, provided they are not too small.

The strength of forces which must be considered for defense of an inhabited place can always be more limited when there exists considerable time for construction of all installations of defense. Placing too great a force within an inhabited place for its defense may constitute a grave error, especially when the possibility of enemy gas attack has to be considered.

A decisive role in defense of inhabited places is played by *selection of the main line of defense*. With reference to this, we may distinguish the four following cases:

1. Main Line of Defense in Front of the Place

Disadvantages: Defense installations located near the main line of defense lack shelter and protection that the inhabited place can afford. Communication toward the rear is rendered difficult.

Advantages: Infantry located in the most advanced defense installations is out of enemy fire which most probably will be directed at the edge of the locality. Besides, infantry so disposed will be exposed in lesser degree to unfavorable factors affecting morale.

2. Main Line of Defense Through the Edge of the Place

Disadvantages: The most advanced infantry is exposed to strong enemy bombardments and morale will be affected to a greater degree. The danger exists that, during enemy assault, troops will not emerge from cellars and shelters in time to resume their places at defensive installations where they have left their weapons.

Advantage: Establishment of the main line of defense along the edge of the locality possesses the advantage that terrain in front can also be directly attacked by the defenders.

3. Main Line of Defense Through the Center of the Place

Disadvantage: It is not possible to make a frontal attack on the terrain directly in front. Effectiveness of flanking fire from neighboring sectors in front of the inhabited place is not always certain.

Advantages: As a trap, the inhabited place may be fatal to the main combat forces attacking it, especially in places of considerable depth. The preparatory bombardment of the attackers' artillery, etc., may not follow with absolute fidelity the course of the main defense line, in which case it will be of slight effect. In addition, there exists the chance that attacking infantry may be subjected to surprise action from this main line of defense by the

employment of weapons still intact after the bombardment.

4. Main Line of Defense in Rear of the Place

Disadvantage: All advantages which an inhabited place offers to the defender are given up.

Advantages: The inhabited locality may be fatal to the enemy as a trap, especially if it is located in open terrain and attracts the enemy as he advances. Encounters during attack and ignorance of the location of the most advanced defensive positions expose the attacker in the interior of the place not only to the effect of gun fire but also to the most powerful mental impressions. Mines of all kinds placed by the defender inside the place may cause serious and irreparable losses to enemy forces.

No standard method can be given for selection of the main line of defense.

Advantages and disadvantages need to be analyzed in each case.

Selection of a line is facilitated when the most pertinent factors are known.

Making Use of Inhabited Places in Delaying Action

Inhabited places of considerable depth facilitate orderly retreat of friendly forces. They possess the particular characteristic that successive delaying lines can be located at a short distance from one another. Under these conditions it will be possible even with weak forces to hold the enemy in check over considerable periods and cause him serious losses. Besides, it is always possible in an inhabited place to deceive the enemy with respect to the strength of friendly forces. Frequent changes of position by all types of troops and small scale attacks with a limited objective effected with weak forces can deceive the enemy and delay his advance considerably. Attacks with limited objectives executed in inhabited places always promise the opportunity of great success when the enemy attacks imprudently or incorrectly and fails to keep his reserves close enough at hand.

They Built the Atlantic Wall

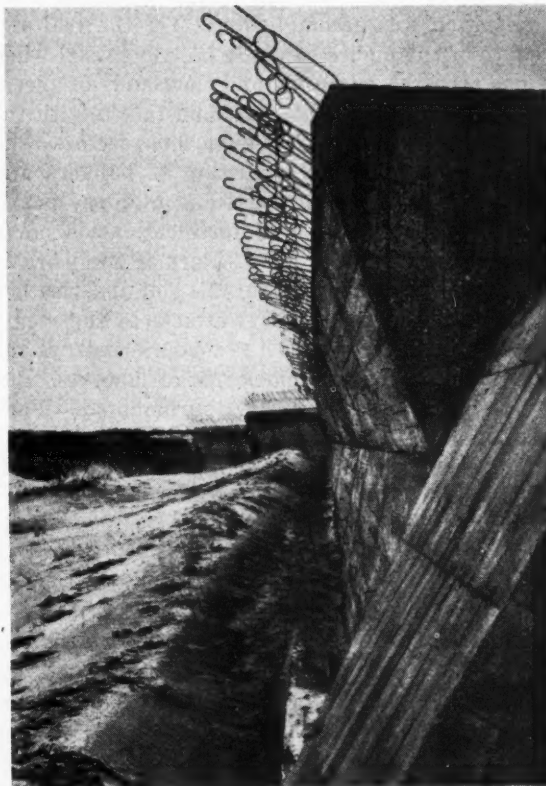
Interviews with Officers, Construction Foremen, and Laborers of the Todt Organization.

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article by K. L. Tank in *Die Grüne Post* (Berlin) 25 April 1943.]

A General Speaks

THE GENERAL who had explained the extent and purpose of the fortification system on the Atlantic and northern coasts concluded with: "We do not underestimate the power of our adversary. We know that the English are excellent seamen. We also know that, morally, the Britisher proceeds wholly without regard for consequences. We are not ignorant of the fact that back of the English the Americans

are standing with means which should be considered. But we also know just as surely and certainly that if the enemy attempts an invasion in the west he will run into a coast that is guarded by very good troops and which is heavily fortified. The fortification system in the form of a 'West Wall,' as com-



GERMAN ANTITANK BARRIER, PART OF THE "ATLANTIC WALL."

manded by the Führer and carried out by the dependable Todt Organization from Norway to the Bay of Biscay, is virtually completed. The Atlantic Wall now stands. When the enemy comes, he will have the opportunity of learning how tough these fortifications are."

In these words are to be found the highest recognition that can be accorded to men of the Todt Organization and their Chief, Reichsminister Speer. These men, who at one time under the orders of Dr. Todt built the "West Wall" in a surprisingly short time, followed the fighting forces in the French campaign. They rebuilt factories; built bunkers, landing fields, and those enormous, invulnerable submarine bunkers which make it possible for the navy to carry on the war against enemy supply shipping on all the seas of the earth. They are now about to complete an unbroken system of fortifications on the Atlantic and northern coasts surpassing the "West Wall."

The Chief Director of Construction

"The accomplishment of these tasks has not been easy. There was a sea coast over 1,600 miles in extent, and mostly flat, to be fortified." The chief di-

rector of construction responsible for technical features of the work explains to us in curt sentences and with convincing figures the extent of the now almost completed labors. When we learn that at the time of greatest building activity, the monthly amount of concrete used was twice that in the case of the "West Wall," we can realize what the Todt Organization was accomplishing. Yet the real significance of this figure can only be understood when one has seen the hundreds and thousands of pieces of construction along the coast and talked with the construction foremen of the various sectors who were engaged in the construction of bunkers and armored installations, of coast and highway barricades. The gigantic line of fortifications is being built with 90% foreign labor. Part of the work is being done in spite of unfavorable soil and weather conditions, in the face of heavy attacks by the enemy who often in the course of a few hours destroys the camps of hundreds and thousands of laborers. But all these difficulties have been surmounted. Work has been done better and completed more rapidly than the enemy suspects. Time limits for completion are not being postponed. Directors of the Todt Organization and, above all, the old, battle-tested Todt Organization laborers see to that.

The Old Todt Organization Laborer

The reader must have seen these men on the Atlantic and northern coasts. They have an odd appearance in front of the deserted facades of the high class hotels in La Baule or Ostend. They wear coats on which one can see the marks of war and of their hard daily tasks. Their hands are gray and cracked. But their eyes sparkle in sunburned, furrowed faces. They know why they are working here under hard conditions and with all their strength. They get, from the French or Flemish, from the Dutch or Moroccans, of whom they at times have from one to two hundred under them, the greatest output of effort. And many of these common men who have not seen their wives or children for months or years have been able to make it clear to the non-German laborers under them that it is not alone a defense wall for Germany that is being erected here, but a protective wall for Europe which will first of all protect the homeland of the French and Flemish, of the Walloons and Dutch. Little by little the European laborers comprehend this and they recognize in the wall which they are building along the Atlantic and northern coasts the first great communal task of the European continent.

The Help of the Front Line Commanders

Front line commanders have contributed a great deal to this recognition. They shape the wills of the men in the labor camps, men who are frequently of heterogeneous composition, into a uniform mold. Naturally this requires men with special ability as leaders. Any one who has accompanied them through

a camp or about a construction site has realized the value of their work. Men of various other nationalities who have proven themselves as volunteers on the eastern front have been successfully used as sub-bosses.

With a purely mechanical conception of the job and a materialistic management, work on the Atlantic and northern coasts could not have been carried out. Something had to be added, something possessed only by the men of the Todt Organization, experienced in labor and tried in battle, a fanaticism built up of belief in Germany's final victory which surmounts stubbornly and calmly all difficulties and which in the days to come will suffice for the task at hand.

The Navy of the RAF

[An article by Raphael Nelson in *The Fighting Forces* (Great Britain) August 1943.]

IT SEEMS paradoxical to speak of surface ships and crews as an integral part of the R.A.F.; but the servicing, maintenance and scope of the varying types of coastal aircraft in use today could hardly function without them. An organization which can boast of its own small shipyards, slipways, workshops, and the paraphernalia usually connected with ships and the sea is, in fact, operated by Coastal Command, and is known as the R.A.F. Marine Section.

The news bulletins of the B.B.C. and the Press generally have already made the public familiar with the fast R.A.F. launches which snort their way through the seas on the merciful errand of picking up survivors from our own as well as enemy aircraft; at times, too, from wrecked ships. But these racing rescue launches represent only a small part of the R.A.F. navy and its varied duties.

Little heard of are the many other craft in use, such as the large pinnaces, flying boat refuellers, trawler and drifter auxiliaries, pilot-cutters, bomb-scows, fast dinghies, mooring-boats, and armored target-boats.

By far the largest of the craft in use are the rescue launches, which are powered with Napier aero engines capable of developing a top speed of 40 miles per hour and a cruising speed of 32 miles per hour. They are 63 feet long. Often they have to stand up to raging seas and lashing winds, and the job, especially in the winter, is about as hazardous and onerous as only work of this nature can be. Such are the enduring qualities of these launches that, for twelve unbroken hours, if need be, giving them a range of something like 500 miles, they are able to plough the seas at their top speed. Until the merciless Nazi airmen made it their business to swoop down and attack the rescue launches, even when out to save their own nationals, these craft were unarmed. Now they carry defensive machine

guns, but use them only when directly threatened. It is usual for the rescue launches to work in cooperation with aircraft acting as "spotters." When these locate a crashed fighter or bomber or torpedoed ship, they make known its position to the launches by repeated dives over the spot. At other times the assistance of the rescue craft is sought by operational planes which may have shot down an opponent into the sea, or witnessed the loss of one of our own. On immediate receipt of such messages, away scorch the launches to pick up survivors and, where necessary, apply first aid; bunks and first-aid outfits are kept on board. On reaching the scene of peril nets are thrown over the side to help survivors up. Accurate navigation is of paramount importance. Often the launches have to thread their way through tortuous lanes in mine-strewn areas or plot courses from information received; and unless the officer in charge were a qualified seaman (he must hold the Board of Trade's Master Mariner's Certificate) it would be impossible to operate the service. As a rule, the men in command of the launches are former Royal Naval Reserve officers. Each rescue launch carries a crew of ten. They comprise engineers, two wireless operators, two first class coxswains, and three deck hands.

Possessing nothing like the power and speed of the rescue launches, but nevertheless doing a fine job of work, are the stout pinnaces. Their 300-horsepower Diesel engines give them a speed up to 14 knots. They are 60 feet long and have a beam of 14 feet. Their main function is the servicing of Coastal Command's flying-boats; but they are also put to such other uses as recovering practice torpedoes, transporting stores, and laying flare paths on the sea's surface for seaplanes landing at night. In addition to these varied duties, when occasion calls for it they take part in rescue work. A crew of five is carried.

Mention has been made of fast dinghies. Fitted with outboard motors, these nippy little craft perform a special task. They race out to meet incoming flying-boats back from photographic reconnaissance, from whom they take the precious film. Speed is essential; and back dart the dinghies to shore, where they hand over the film to the development department. Often the pictures are printed and scrutinized for information before the crew of the flying-boat which brought them is able to reach land.

Another craft in use by the R.A.F. navy for a special job is the armored target-boat. It is the queerest of all jobs undertaken by a boat and calls for nerve, resource, and not a little energy. The armored target-boat is the one which exposes itself to practice bombing with live bombs in order to help our bomb aimers drop their destructive loads with all the accuracy possible. Because of the risks involved special "danger money" is paid to the crew of four, who undoubtedly earn it! In their little

"funk hole," with their crash helmets and earplugs, the four adventurous men rush their boat about in a crazy pattern to avoid the small bombs which pound down on and around them. It affords excellent practice for our airmen in dealing with ships attempting evading action. As for the crew, so well versed are they in the art of righting their boat after receiving a direct hit that they often scramble aboard within a short space of time and signal for a further dose! The armored target-boat can "take it." It is covered with three and a half tons of plating and is unsinkable.

Compared to the armored target-boat the work of the R.A.F. mooring-boats is dismally dull, though each has its part to play in the general scheme. Theirs is the task of maintaining in good working order the numerous mooring sites of the flying-boats. It is a job which takes the crews a good way round the sea-girt coast of these islands.

Although the famous R.A.F. speed launches cover almost the entire ground in that particular sphere, work similar in essence but not quite the same is carried out by what are known as seaplane tenders or "crash boats." These workmanlike craft are used as a stand-by when the monster flying-boats take off or land. Should some mishap occur they are on the spot for immediate assistance.

A job with more than a grain of excitement is the work carried out by the crews of the R.A.F. drifter auxiliaries. These are used to represent shipping in practice for our torpedo-carrying aircraft. They also pick up the special torpedoes after they have been discharged at them. The duty of these drifters is to avoid at all costs the diving planes and make it as difficult as they can to be struck by the torpedoes. They employ all the artful tricks they know, and accurate indeed must be the aim of the torpedo hoping to find its mark against the evading tactics of these boats. Pilot-cutters are also used in this work.

The R.A.F. refuelling craft, as well as the handy bomb-scows, carry out afloat what truck and trolley do on land. The first, as its name implies, is a "tanker" with a load capacity of 2,500 gallons; the second, the floating bomb trolley. Both are at hand when the huge flying-boats return from their patrols, ready to refuel and reload them for further work.

The work of the R.A.F. Marine Section is, in essence, as silent as the Royal Navy's; and only very occasionally do we hear of the good work being done by all ranks comprising it.

A German Estimate of Foreign Tanks

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article by Heinrich Kluth in *Berliner Lokal-Anzeiger*, Berlin, Germany 26 June 1943.]

In A German collection of enemy tanks the "Gen-

eral Sherman" completes the already great number of various enemy types tested by our military experts for the purpose of determining their most vulnerable parts and for obtaining, if possible, ideas which might be useful in our own tank construction. Also the "General Lee" is there and stands alongside the "General Stuart" of only thirteen tons weight in order to show the development of the American tank.

The "Sherman" is ready to go. The built-in mirrors give a good impression of the visional possibilities from the interior of the tank. To the right of the 7.5-cm long-barreled cannon is the built-in sighting mirror which is provided with telescope sights with fine adjustments. The tank rolls along with steadily running motor over dusty roads and prepared slopes and rises. It runs well, that cannot be denied.

On a steep slope the "Sherman" stops. The treads dig in and grind away in the sand without being able to get a good grip. The tank is backed down a few meters. Then another start is made. Again the treads merely grind into the surface in this place, which is, however, the most difficult place of the test course. This time the motor stops also. It has been killed. But there aren't really any such slopes in the natural terrain. Again we back off. At the third attempt, the "Sherman," panting and groaning, succeeds in getting over this superdifficult obstacle.

We could give other details of this American tank which from point of view of construction, is without any question the best-worked-out model possessed by our enemies. Its armor is designated as "good" by experts of our armed forces. But in spite of this, the "Sherman," both with respect to size and armament, is not up with the most recent German tank, the "Tiger," which has given the best of accounts of itself on all fronts. Standing alongside one another, the "Sherman" and the "Tiger," it is clearly apparent that the American construction cannot come up to that of the Germans.

In contrast with the Americans, English, and French, who prefer to employ cast steel in constructing their tanks, the Russians at a relatively early period made use of welded construction which was also successfully employed in Germany. In an enormous hall they can all be seen standing alongside one another, the tanks that were developed and built by the Soviets. There are a great many different types which show clearly that they were strongly influenced in their construction by the types developed in other countries. There are amphibious tanks and types of construction which even the expert will say show plenty of progress. The 28-ton T-28 tank (the Soviets still call armored combat vehicles "tanks," so that every designation of a type is preceded by the letter "T"), one model of which was first shown in a parade in Moscow in 1932, was at that time fitted with a water-cooled BMW-VI airplane motor which the Bolsheviks had carefully copied from a German pattern. An impression of power and weight is

gained from the 45-ton T-35, which has a length of 9.7 meters, a width of 3.21 meters, and carries a crew of 10 men. In the well-known T-34 (26.3 tons) with armor of 45-mm thickness, the Soviets make use of a 500-horsepower Diesel motor whose fuel injection pump is so closely copied after a German model that Bosch replacement parts can be used in the captured Soviet tanks. With this T-34 and the later 43-ton KW-I the Soviets at that time far outdistanced all the foreign types. When we look upon these colossi, we are filled with wonderment at the thought of our men on the front who, with materially weaker equipment, time and again met and conquered these Soviet tanks.

Regarding English and French tanks, which stand in another hall, there is no longer much to be said. They were, to be sure, not bad at the time they were employed, whether we are speaking of cruiser tanks or of the 38-ton "Churchills" used at Dieppe, but they are not up to the Soviet nor American developments.

With regard to French tanks, there are a great many types here in which one can see the absolute insistence on safety. Everything is built, as in the case of the Maginot Line, with an eye to safety. It has obviously been overlooked that both armament and speed suffer as a result of this.

Outside the hall stands a model of the legendary 72-ton French tank, the Char 2-C. This was the giant tank which at the beginning of the war played so great a role in enemy propaganda. It is equipped with a 7.5-cm cannon and bedecked with four machine guns. Thirteen men were supposed to constitute its crew. Its gasoline-electric drive is the only one of its kind in the world. It employs two 250-horsepower Maybach airplane motors.

One tendency is to be recognized in this review of the enemy's tanks: Tanks are becoming larger and more rapid, and their cannon are becoming more effective. Germany will see to it that the superiority obtained with the "Tiger" is maintained in the future.

An Armored Scouting Mission in Russia

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article by Captain Riedel, German Army, in *Die Panzertruppe* April 1943.]

THE ARMORED division had been stalled for a day at a bridge on the route of advance toward "W," twenty kilometers south of the city (see sketch). It was decided therefore that the battalion should try to reach the east-west road running through "W" and reconnoiter a new route by which the division could advance. Two scouting detachments were sent out. If the first of these detachments found that there was a bridge in condition at "A," the battalion was to follow by this route. Three-quarters of an

hour after it set out, the scouting detachment was able to report "Bridge in order." In fact the bridge was a bit wobbly, but the three light cars were able to cross it safely, and without encountering hostile opposition the battalion advanced through forest and swamp over a road that was just passable.

On our right we could hear the noise of battle at the main bridge. Then suddenly in front of us four Russians appeared with rifles on their shoulders. They surrendered willingly and climbed up behind us. We could make nothing of their signs and gestures and could not find out whence they came, but it was necessary now to proceed more carefully because where there were four, there might be others. The gunner kept his eye on the sight, the commander no longer sat on the edge of the tank, and the driver closed the shutters somewhat. Nothing was seen of the enemy until we suddenly reached the roadway running east to "W." We had reached our objective.

Motor vehicles occasionally passed from east to west along the road, and we let them go by unhindered. Then with a great deal of noise three or four large horse-drawn vehicles appeared in the distance. The leader of the scouting detachment, holding his binoculars to his eyes, murmured, "That's artillery, isn't it?" "It is," replied the commander of the third tank. The detachment leader gave his orders immediately: "Machine-gun cars to the highway, secure ahead and to the right. I will go forward with the radio car." With motors humming and turrets turning, the cars moved to the highway and swung to the left, firing with all guns on the surprised columns. The radio car plunged past the

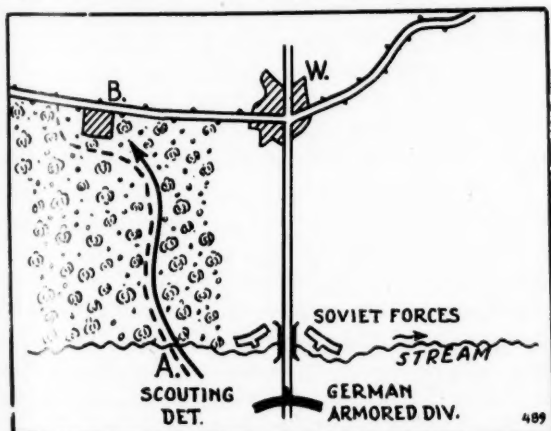
Later the battalion arrived, blocked the road at "B," and sent reconnaissance far to the east. More columns of all types were reported on the march to threatened "W," but nothing more got through at "B."

The armored scouting cars felt their way into "W," moving slowly from house to house, from corner to corner. One of the cars succeeded in putting an enemy gun and its crew out of action. It was later found that the gun was a 7.65-cm anti-aircraft cannon.

The climax of this successful day came at about 1600 when the scout detachment farthest east sighted a very elegant armored car approaching at a dizzy speed. They let it come to within a few meters and then opened fire. The car skidded, recovered again, and came to a stop by a fence. At the first shot a brown, heavy figure had fallen from the car. It was a Soviet general, twice decorated with the Order of Lenin, who was on his way, all unsuspecting, to "W."

Toward evening the first units of the division, consisting of tanks and artillery, came up over the new route. After firing on "W" for a short time, the tanks attacked and took the city. The enemy quickly gave up resistance there and also at the bridge site when he found that we were on his right flank.

The mention in the corps order of the day that we were the first in the division to capture an enemy general was the finest reward for the crews of the armored cars and the men of the detachment.



confused mass of men, horses, and vehicles and came to a stop a few hundred meters away, providing security to the east. The commander himself came to a stop beside the enemy guns and made prisoners of a few wounded men. Then he fixed a kilogram charge to each of the three gun barrels and lit the fuses. As the smoke of the explosions slowly drifted away, our three cars disappeared into the woods like ghosts, to observe once more and if necessary to attack. The new prisoners peacefully joined the old ones who had remained meekly on the spot.

Military Secrecy

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Russian article in *Krasnaya Zvezda* 29 July 1943.]

MAINTENANCE of military secrecy is the first and obligatory condition of success in any attack. The most excellent plan of action is useless if the enemy learns of it in good time. The most powerful and concentrated offensive loses a good half of its effect if the enemy expects it. Experience of war teaches that action without surprise, without preserving strictest secrecy of all intentions of the commander, is unthinkable if success in battle is to be attained.

Military secrets are concentrated in various documents: combat orders, reports, staff maps, etc. It is evident that these documents must be guarded against any possibility of loss. Laxness and carelessness in handling secret documents is a very grave crime against the State. It is not simply a matter of keeping secret documents, as the saying goes, "under seven seals," in especially equipped places, and under reliable guard. For sometimes the order lies in a safe at night but during the day it travels from one staff room to another, from desk to desk, visible to the eyes of anyone who enters. It must be an ever-

remembered law that everything connected with military secrecy is performed with the utmost system and care. In working on secret documents and in distributing them, especially under field conditions, the very strictest organization is essential.

It has long been an unquestioned truth that the fewer the people who know the command's plans and intentions, the better. But in some units it happens that while an operation is being prepared it is subject to wide-spread rumors long before it is launched. Why does this happen? Primarily because the number of people informed of the intentions of the command is sometimes too large. From one man is demanded the fulfillment of a separate, concrete task; but when being assigned this task he is handed almost the whole plan of operation. This contradicts the elementary rules of security. It must be a firm rule that a military secret is entrusted only to those absolutely necessary to the conduct of the matter.

Along with this it is essential to employ severest measures to prevent all talk on questions connected with proposed combat operations or with intentions of the command. There are those who like to boast of their knowledge, those "home-grown strategists" who are always ready to discuss the development of events, disclosing everything that is on their minds. There are also those heedless people who simply forget that the enemy is sly and cunning, that even the walls may have ears. Where there is talk of military secrets, the soldier of the Red Army, when off duty, must have only one rule of conduct: *silence*.

Every soldier of the Red Army and every officer must be a vigilant, watchful guardian of military secrecy. It must be remembered that often just one careless word dropped by chance, one hasty move however insignificant at first glance, may give the enemy the key to the riddle of the most important intentions of the command. It is enough, for example, for a German spy to overhear on the street the conversation of two officers concerning when and whence they arrived, and it will be clear to him that a concentration is taking place; he will be able to determine the nature of the regrouping of our troops. The officer may not even mention the word *attack*; but nonetheless, by his whole conduct among people, by unusual excitement, hurried assemblies, etc., he discloses the secret of the operation in preparation. That is why the very keenest watchfulness and the greatest restraint must be the firm rule of conduct of the Soviet officer in any situation.

To preserve military secrecy means to close up all but one chink, all passages through which even secondary signs of prospective operations might seep out to the enemy. Is it not clear, for instance, that it is impossible to speak seriously of watchfulness if staff officers are lodged in the same houses with local inhabitants? Is it not clear that it is impossible to depend on preservation of military secrecy if preparation for shifting the command post is ac-

companied by fuss and commotion before the eyes of the whole population? It is necessary to take into account every trifle, everywhere and in everything, striving for the greatest concealment of action, not stopping even at misinforming those not directly concerned. This is particularly essential during preparation for the prospective operation. Employing all methods of concealment and military cunning, it is necessary not only to hide from the enemy the fact of such preparation up to the very last moment but also to do everything to lead the Germans astray and deceive them.

Guard the secret of each operation, of each intention of the command, with all your strength and by every means!

German Engineers in the Attack on Stalingrad

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article by Friedrich in *Vierteljahreshefte für Pioniere*, No. 1, 1943.]

This report of the engagement of an engineer battalion in Stalingrad was written when the Sixth Army was attacking the city. It shows that our engineers gave their best in the attack just as later, in the defense, they made their heavy sacrifices.—THE AUTHOR.

THE DIVISION was able to launch the attack on Stalingrad on 5 September 1942. Engineers were placed with each regiment and battalion. It had become axiomatic that they were to be found in the center of every action.

On 13 September the regiments stood ready for the attack before the great sea of buildings over which, black and threatening, floated the heavy smoke from burning structures and from explosions.

By evening the suburbs in the division's sector were in our possession. On the following day the railway area had scarcely been taken when the leading forces reported: "15:16 o'clock, the Volga reached!" Important as this success was, the rapid attack in the direction of the river had left a great deal in the enormous confusion of houses and industrial establishments that was not yet mopped up; long days and nights of bitter fighting were yet to follow.

Experiences of the year before caused us to suspect that Stalingrad, like Kiev and Kharkov, would be entirely destroyed by the Soviets. The day's experiences appeared to confirm this suspicion. Hundreds of mines in wood casings were removed, and every street, every intersection, whole areas, and individual houses had to be searched carefully and painstakingly—a nerve-racking task which required the greatest watchfulness and discipline on the part of every one.

In order to carry on the work systematically, the

battalion established a mine reporting center. Incoming reports were checked, street after street and house after house; all the extensive over- and under-passes in the street system and all industrial establishments were thoroughly searched. The engineers were constantly engaged in this task in a hail of bomb and shell fragments.

Companies of the engineer battalions were divided into assault detachments and were constantly engaged shoulder to shoulder with men of the other arms. In addition to this they continued to provide security for the main line of defense that had been reached in the city by the establishment of mine barricades and *chevaux-de-frise*. The daily advances and heavy losses testified to the energy of both officers and men.

In one place a fire-spitting bunker was holding up the infantry advance. Two courageous engineers succeeded in creeping up to the enemy with their flame throwers, their comrades providing fire protection for them. The red column of fire leaped from the nozzle and struck the port-holes and other openings, destroying everything with the glowing flame. The infantrymen leaped to their feet and rushed past, taking advantage of these few minutes of silence. Two positions were passed in this way. On the same day these same men, with their flame throwers, smoked out a whole group of houses which had been built into a formidable center of resistance.

Streets leading to the Party Building, symbol of Bolshevik defense, were blocked by barricades which stopped our tanks. Engineers worked their way ahead from house to house and hurled concentrated charges of explosives against the barricade. At the moment of explosion they leaped forward into the smoke, rushed through the holes that had been blown in the barricade, and broke the enemy's resistance. Thus engineer assault forces cleared the way for infantry and tanks.

For days we had suspected that the enemy was making use of underground passages from one part of the city to another for communication and supplies. An entrance shaft was discovered back of a stone house. The engineers charged across the open square, overpowered the occupants of the building, and destroyed the entrance to the passage by means of explosives.

Time and again the enemy attempted to establish himself in houses and cellars, on roofs, and in the confusion of ruins; but the engineers always came to the rescue and broke all resistance with their varied weapons.

At one point an entire building unit, like a powerful fortress, was holding our attack in check. From all openings and embrasures heavy fire was being laid down. All alone, a single engineer fought his way through, on his back the heavy burden of a flame thrower. He directed the nozzle at the nearest opening in the building and in quick succession the bursts

of flame penetrated all crevices and apertures. Everything succumbed under the crackling, fiery blast. The rattle and cracking of rifles and machine guns ceased. Timbers came crashing down and the walls crumbled. One hundred and fifty Bolsheviks, two commissars, and one captain barely escaped with their lives and, seized with terror, surrendered to this one engineer.

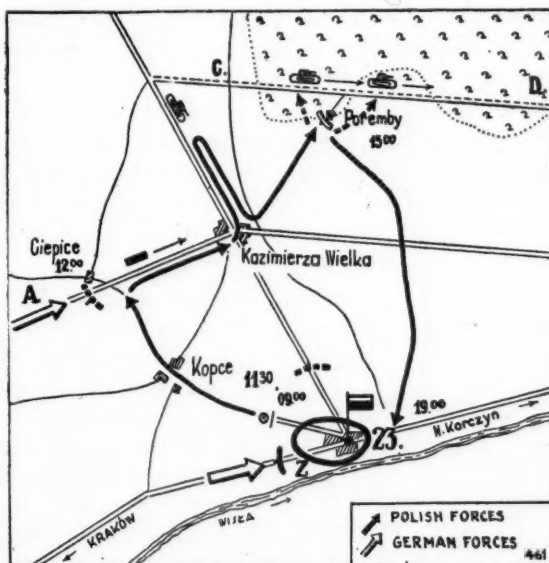
And so the fight goes through the city. Successful work by the engineers speeds up the attack, and at last the division is firmly established on the bank of the Volga. The heroic group of engineers is but a small one, yet it has stood this hard test unbroken and in exemplary manner.

For days now the swastika flag has been waving over the city. Our forces are establishing themselves for defense and getting ready for the counterattack of the enemy. Again it is the engineers for whom there is still no rest. They are engaged in building positions for all units, and in erecting combat positions they are just as indispensable as in the fighting itself.

Initiative in Reconnaissance

[An extract, translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Polish article, "The Role of the Commander in Battle," in *Bellona*, monthly publication of the General Headquarters of the Commander in Chief of the Polish Army, London.]

GENERAL SITUATION: The 23rd Infantry Division of the Polish Army, retreating along the route Krakow-Nowy Korczyn in contact with the enemy, reaches the vicinity of "Z" at dawn, 8 September



1939. Because of the fatigue of his division after several days of combat, the commander decides to go into bivouac. The losses of the division so far are about 35% in personnel and about 20% in matériel.

To the north, the group of Colonel R. is retreating along the route from "A" to Kazimierza Wielka.

In this situation the 23rd Infantry Division issues the following order to the commander of the division's bicycle company: "Mission: (a) Reconnoiter the region Ciepice-Kazimierza Wielka and establish liaison with Colonel R. who should be approaching Kazimierza Wielka. (b) Inform Colonel R. that the division goes into bivouac in the vicinity of "Z," where it will probably remain until dusk 8 September 1939, following which it will proceed in the direction of Nowy Korczyn."

Execution: The commander of the reconnaissance detachment is commander of the bicycle company. Composition of the reconnaissance detachment: one bicycle platoon. Route: "Z"—Kopce—Ciepice—Kazimierza Wielka. Return: any route. Reports: after contacting the enemy; after reaching the highway "A"—Kazimierza Wielka; after establishing liaison with Colonel R. Reports are to be sent via two routes. Time of start: 0900.

Course of action: At 0900 the commander of the reconnaissance detachment starts on his mission and reaches Kopce where he hears sounds of battle coming from the northwest. He decides to proceed in the direction of the battle and sends a report to this effect to the division commander.

At 1200 he reaches Ciepice where he ascertains that the group of Colonel R., under cover of rear guard which is in contact with the enemy two kilometers west of Ciepice, is retreating in the direction of Kazimierza Wielka. At Ciepice the detachment commander personally establishes liaison with Colonel R. whom he informs of the division commander's decision. Thereupon the detachment commander proceeds to Kazimierza Wielka, having dispatched a report to this effect to the division commander.

From Kazimierza Wielka, on his own initiative, he accomplishes reconnaissance along the road to "C," and at a distance of about fifteen kilometers he finds several enemy tanks and truck-borne infantry moving on Kazimierza Wielka. He sends a report of this to the division commander.

At 1400 he returns through Kazimierza Wielka and, again on his own initiative, he accomplishes reconnaissance in the direction of Poremby where he arrives about 1500. At Poremby he finds an enemy motorcycle unit. He sends patrols to reconnoiter the route "C"—"D" leading to Nowy Korczyn and finds an enemy tank column proceeding east on that road. He sends a report of this to the division commander and to Colonel R. and returns with the detachment to "Z" where he arrives about 1900.

On the basis of the last two reports concerning the enemy armored elements, the division commander decides to break up bivouac and proceed to Nowy Korczyn at once. Note that both these vital reports

were entirely the result of personal initiative on the part of the commander of the reconnaissance detachment.

Enemy Blockade Runners

[An article in *The Fighting Forces* (Great Britain) August 1943.]

SINKING of enemy blockade runners, of which we get news from time to time, is of far-reaching importance to the Axis Powers. Such ships cannot be assessed in the same class as ordinary supply vessels. Blockade runners might be described as Number One Priority Ships. Their value and the value of their cargoes to the Axis powers is in ratio to the risks the vessels run in attempting to make passages between enemy-controlled ports, which are in many cases separated by distances amounting to more than half-way round the world.

For these reasons, blockade runners are invariably modern, fast ships with sea endurances far above the ordinary; they are, in fact, a class of vessel which the Axis powers can ill-afford to lose.

This traffic, or more properly the traffic which the Axis partners attempt to maintain at such high cost to themselves, is two-way. That is because in many important respects the economic resources of Germany and Japan are complementary. Germany requires raw materials for her war industries. Japan needs chiefly machine tools, with which to increase her war potential and exploit her raw-material gains.

With the closing of the Trans-Siberian Railway in June 1941, trade between the European Axis nations and Japan could be carried only by sea. From the Southwest Pacific to the Biscay coast is a voyage of about 12,000 miles, but one within the range of a modern Diesel-driven ship. Blockade runners have the choice of either the Southern Pacific or the Indian Ocean, and throughout their voyage they need never come within 600 miles of an Allied base.

Some small-scale attempts to run the blockade were made in the autumn of 1941 with goods which Germany had brought for transport by the Trans-Siberian Railway, and with a substantial quantity of rubber obtained from Indo-China.

Japan's entry into the war gave an added stimulus to this traffic. Her only source of supply for the goods she needed was then German Europe. In addition, her conquests had provided a bargaining weapon in the form of a large surplus of raw materials—this at a time when Germany, heavily committed on the Eastern Front and opposed by America as well, had become faced with a long war.

At about this time plans for much-increased blockade running appear to have been put into effect. The Allied navies were then very much preoccupied in the Far East, and these plans met with some success.

It was probably against the background of this

success that the terms of a new Axis economic agreement were framed. Last January the partners announced that they had signed a treaty to "extend their economic collaboration so as to support each other more completely in the war by the extension of their economic exchanges." The theory was all right, but very soon the widely separated Axis partners discovered that Allied naval and air patrols were frustrating the execution.

Since the early autumn of last year attacks on blockade runners in the Indian Ocean, in the South Atlantic, and in the approaches to the Bay of Biscay have become increasingly successful. It is probable that cargoes bound for Europe and intercepted since last November, include no less than 30,000 tons of rubber, 5,000 tons of tin, and 25,000 tons of edible oils, and smaller but equally important quantities of tungsten and quinine.

The cargoes lost to Japan consist of heavy machinery and machine tools and engineering components, dyestuffs, and so forth. These commodities are of no less importance than the German losses. The implications of the Japanese losses are more difficult to draw than the effects of the loss of raw materials selected by the Germans themselves with an eye to their most urgent requirements.

To be seen in proper perspective, the great success of the Allied Navies at sea must be related to the enemies' war effort as a whole. Germany has been unable to liquidate a huge military commitment and is continuously engaged in land fighting; the drain on her stocks of both finished products and the raw materials required to make them has been heavier during the past nine months than ever before. In the same period, an important source of supplies in North Africa has been closed; industrial centers of the Reich itself and the enemy's land and coastal communications and other important economic objectives have been subjected to an ever-increasing weight of attack from the air.

Substantial as our successes have been, it cannot yet be assumed that Germany and Japan will not make further efforts to maintain sea communications with each other. The adventurous blockade runner, cleverly camouflaged and ingeniously routed, always has a chance of getting through. But with the Allies' increased and increasing strength in ships and aircraft, and the creation of new bases from which to operate, the passage of blockade runners will become increasingly hazardous.

Antitank Strongpoints

Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Russian article by Captain of the Guards V. Korol, Soviet Army, in *Krasnaya Zvezda* 9 July 1943.]

PRACTICE shows that a system of antitank strongpoints is most effective in repulsing tank attacks.

This system not only is a dam capable of restraining the avalanche of attacking tanks, but also is a gigantic mill whose grinders convert hostile tanks into heaps of metal. Of course, such effect can be attained only by skilful organization of antitank positions.

From reconnaissance the commander determines the main and secondary direction of tank attack as well as sectors of terrain impassable for tanks. Where terrain is accessible for them (flat or dissected but without deep gullies and swamps), there will naturally be more antitank strongpoints. During reconnaissance, the senior commander [in the given sector] designates places where use of antitank guns and rifles will be most feasible. He considers just what elements to dispose in this or that antitank position and determines the character and types of obstacles most useful in the given situation.

It must be remembered that not every sector which seems impassable to tanks is really so. For this reason it is recommended that a system of fire be organized so that even approaches to regions not accessible to tanks may be covered. If the commander disregards this, events may turn out as in the following example.

Fifteen German tanks attacked the forward edge of our defense. On the sector where the hostile attack started, an artillery battery was active. Its left flank adjoined a ravine accessible to tanks only with difficulty. The artillery beat off three German frontal attacks without much trouble. But then the Germans with the aid of their sappers blasted the precipitous slopes of the ravine and made it passable. Approaches to the ravine were not covered by specially designated artillery elements. The neighbor on the left failed to open fire. Hostile tanks took the ravine and fell on the battery from the rear, and the position was maintained only by committing the antitank reserve into battle. If the commander had provided fire cover on approaches to the ravine, the Germans, of course, could not have reached the rear of the battery.

The commander in direct command of the antitank strongpoint must estimate what fire elements he needs and how best to dispose them in the terrain. The quantity of weapons needed depends on anticipated density of enemy tank attack in the given direction. If available antitank agents are insufficient, the commander then asks the senior commander to add to them. But if the senior commander has a limited number of antitank guns and rifles, he, of course, does not scatter them through the whole defense but uses them to protect against probable enemy main efforts.

Some commanders, in estimating the means needed for antitank defense start with the theoretically possible density of tanks in attack. But on a number of sectors the Germans actually have a very

limited quantity of tanks. Hence it is necessary to take into account not theoretical but anticipated density of the tank attack. If it becomes known that the enemy has brought up tank reserves, the anti-tank strongpoints may be correspondingly reinforced.

It is very important to see to it that all approaches to strongpoints and the intervals between them be covered with dense crossfire. Besides that, fire elements are disposed so as to make it possible to hit enemy tanks in case they succeed in breaking through into the rear of the strongpoint.

Combat experience shows the effectiveness of the following distribution of antitank guns and rifles. Guns are placed at intervals of 100 to 150 meters and at distances of 200 to 300 meters. Antitank rifles are disposed in squads. They must conduct flank and diagonal fire at the same time as the guns. Intervals between squads of antitank riflemen are 50 to 100 meters; distances, 100 to 150 meters. In flanking fire, the distance between guns and rifles must not exceed 100 to 150 meters.

For protecting intervals between strongpoints, constant communication is set up. Agreement as to methods of cooperation must be complete and detailed. Further, it must be remembered that the distance between flank guns of two neighboring strongpoints must not exceed 500 meters. For antitank rifles this distance is reduced to 150 to 200 meters.

The artillery commander establishes close contact with the infantry unit commander in whose area the antitank strongpoint is organized. Above all, agreement is essential as to use of infantry elements and signal communications. Practice suggests that it is also profitable to set up communication with combat security wherever a special representative is sent. In case hostile tanks appear, this representative determines their number and direction of movement and immediately informs the strongpoint.

For repulse of heavy tank attacks artillery of all calibers and heavy mortars are used. Batteries, firing from concealed positions, register their fire beforehand on approaches to strongpoints and on antitank obstacles erected by the engineers. Of course, careful agreement with artillery commanders as to signals is obligatory in case tanks break through into the rear of our defense. Division artillery and, when necessary, heavy artillery move out to open positions. It is necessary to organize open firing positions beforehand for these artillery elements.

The whole antitank defense is carefully camouflaged. For purposes of camouflage it is necessary to observe strictest fire discipline. It is not necessary to open fire by all guns on single tanks or small groups of three or four tanks. It is better to let them approach to point-blank distance and then open fire. When the enemy undertakes a massed tank attack, guns and antitank rifles fire point-blank at

limited distances. Besides this, there is the mobile barrage fire of artillery of all calibers, firing from concealed positions.

What importance all this has is shown by the following combat episode. At dawn more than thirty German tanks appeared before our defending units. They moved along a road in three echelons. The road was covered by an antitank strongpoint whose artillery battery opened intensive fire. The enemy, leaving seven wrecked and burning tanks on the road, retreated. After an hour and a half the attack was repeated. This time German tanks came in three groups deployed along the front. By the direction of movement of each group of tanks it was easy to see that the Germans had decided to take the battery in pincers. To right and left of the road at a distance of seven hundred meters were two other batteries. At the time of the first attack they had not fired a single shell. When the flanking tanks approached to within 500 meters of these batteries, strong fire was opened. The Germans lost sixteen vehicles and did not return.

It must be remembered that antitank defense cannot be equally strong everywhere. Hence a vital role is played by antitank reserves which are at the disposal of commanders of units of combined arms. These reserves must move quickly to threatened sectors. It is expedient to organize firing positions beforehand for the reserves in those directions where breakthrough of enemy tanks is most possible.

It is good if the senior commander makes a plan of maneuver for antitank reserves. In such plan there are indicated the composition of the reserve, its commander, the line of probable deployment, and the march route in detail. The signal calling for reserves must also be established and must be known both to the commander of the unit of combined arms and to the commander of the reserve group.

Increase of Fire Preparedness in Defense

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article by First Lieutenant Stammer in *Artilleristische Rundschau* December 1942.]

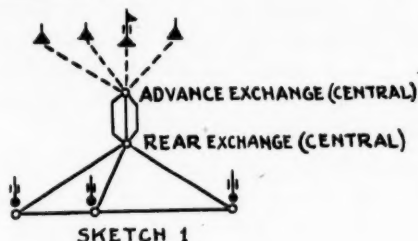
Securing Communications in the Detachment

IN DEFENSE the combined fire of all weapons is required in front of the main battle line to repulse hostile attacks. One of the most important pre-conditions for this is the correct functioning of communications, both for reports and for conduct of fire. In contrast to attack, as wide a net of communications as possible, with many cross connections, must be demanded in the defense position.

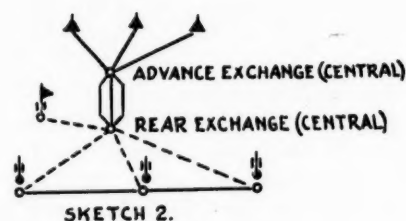
To correspond to this demand the net of communications in our artillery battalion was organized as follows:

The signal platoon of the headquarters battery set up two exchanges: the advance exchange behind the observation posts and the rear exchange near the firing positions.

In general, the battalion command post will be situated with the observation posts (sketch 1). In this case the signal platoon runs wires from the advance exchange to the observation posts and to the detachment command post.



SKETCH 1



SKETCH 2.

LEGEND:

- WIRES OF BATTERIES
- - - WIRES OF SIGNAL PLATOON
- ▲ OBSERVATION POST
- ⊥ ARTILLERY COMMAND POST
- ⊥ GUN IN FIRING POSITION

If the situation, terrain, weather, or road conditions required installation of the battalion command post near the firing positions or the command post of the infantry regiment, then the signal platoon laid connections to the firing positions (sketch 2).

Batteries were instructed to lay their wires to the observation posts through both exchanges. All parallel wires must absolutely be at least fifty meters from each other. If enough cable was still on hand, firing positions were connected with each other. The left battery always laid wire to the right battery.

Thus, even with disturbance of individual lines, connection within the battalion to all its parts was almost always assured.

Each battery sent a troubleshooter to each exchange in order to secure rapid repair of disturbed lines.

The disadvantage of longer wires from the observation posts to the firing positions was compensated for by the advantage of assured connections.

More than that, it was always desirable to connect advance observers, likewise by wire, to each other and to the advance exchange, since maintenance of radio communication required in the long run too much current and was subject to weather influences.

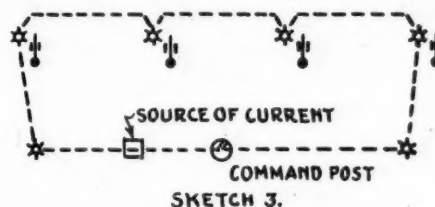
Radio was primarily the communication medium for attack.

The signal officer must be able, on the basis of the situation and terrain, to decide on the most practicable employment of signal equipment, according to the above-cited principles, and to propose them to the commander.

Emergency Illumination in Night Firing

Necessary economy with illumination means, such as pocket-lamp batteries, carbide, and oil, was especially disadvantageous in firing at night, above all when it was a question of rapid preparation for barrage fire. Experience showed that in the defensive moment the media for illuminating aiming devices slowed down fire preparation considerably, if indeed they didn't make it altogether uncertain. Therefore a proposal is made here for securing with the means at hand the illumination of aiming devices for firing at night.

On each of the two aiming stakes a socket with a 2-volt bulb is fixed; for distinction in aiming, one is red and one is blue. A circuit is laid with light cable,



SKETCH 3.

LEGEND:

- * AIMING STAKE
- ⊥ GUN IN FIRING POSITION
- - - WIRES

by which the four night-illumination contrivances of the panoramic sight and the two bulbs on the aiming stakes are connected with a source of current (sketch 3). Available as sources of current are an accumulator of the radio apparatus or tent-illumination apparatus or even a spare automobile battery which can be charged again with the help of the charging outfit of the headquarters battery.

By installation of a switch in the command post, the battery officer can at once set the night illumination in operation.

By this simple process the readiness of the battery is always assured, even at night. With correspondingly economical use of illumination the source of current will last long and spare other means of illumination.

Employment of Armored Trains

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Russian article by Captain V. Morozov, Soviet Army, in *Krasnaya Zvezda* 7 July 1943.]

TACTICAL qualities of armored trains appear most fully when they solve combat problems by the

method of sudden fire. This problem is more successfully solved at night, in stormy weather, or in rain when the enemy cannot discover the approach of the armored train by its smoke and open aimed fire on it.

The more sudden and fierce the blow of the armored train, the greater its effect. One of our armored trains in a battle for an inhabited place succeeded in moving almost to the rear of the enemy at a distance of effective machine-gun fire. Its fire on previously reconnoitered targets was so strong that in a short time these targets were all silenced. The Germans recovered only when our infantry units had already succeeded in penetrating to the center of the populated place.

Armored-train fire may be successfully realized in daytime also if the enemy is not able to bring up artillery to the forward line of his defense for point-blank fire. A characteristic episode occurred in the attack on a town. The Germans were holding its central part, situated across a river in a region inaccessible for tanks. Bridges were blown up and were covered by strong fire from machine guns, mortars, and artillery in hidden positions. Enemy machine-gun and mortar positions in the buildings did not permit our infantry to capture the large open space contiguous to the river. Bringing up guns for point-blank fire also was unsuccessful because the enemy had a good view of the area. But the problem was quickly solved by committing an armored train. While the Germans fired on it, the train was able, by shunting on the yard tracks, to silence thirteen hostile firing points, thus clearing the way for movement by our infantry. The enemy, caught unawares, kept on firing; but the armored train had already accomplished its task and had withdrawn to the rear.

Naturally the success of armored train actions depends on skilful direction and rapidity of maneuver. The armored train of Captain Ibragimov, returning from an action, was attacked by a group of German bombers. One bomb destroyed the track in front and damaged the control platform. This occurred not far from the forward edge of hostile defense. The Germans, encouraged by the successful fall of the bomb, began a counterattack. At this critical moment Captain Ibragimov correctly estimated the situation. It appeared that the only escape from the situation was to stand near the destroyed section of the line, conduct fire from the spot, and at the same time repair the damaged track. But then the enemy might blow up the armored train with combined land and air blows. Captain Ibragimov made a different decision. He sent out a small party for the repair of the track, and himself moved the armored train at full speed toward the enemy. With artillery and machine-gun fire the German counter-attack was beaten off.

Of course, when the enemy is not prepared for

encounter with an armored train and the entire track is unmined, conditions for armored-train attack are favorable. But with present day defense, which involves a multitude of fire elements and obstacles, such conditions are not often present. How then are armored-train attacks to be executed if the situation does not favor their actions?

On one sector of the front where the enemy had a strongly fortified defense, we had several armored trains. The Germans were holding the railroad station and the large inhabited place adjacent to it. The track was destroyed for a distance of three and a half kilometers in front of the forward edge, and it was not being repaired.

During calm weather enemy observers discovered our armored trains by their smoke at fifteen to twenty kilometers. The height of the hills was insufficient to conceal the flash of artillery fire, and when the armored trains opened fire from concealed positions, the Germans registered them by the flashes. Behind the firing positions of the armored trains and leading in the direction of the enemy, there was a section of good track running along the front line. It was well observed by the Germans, and they were registered on it. Still nearer to the enemy the railroad track turned directly toward the hostile positions and here it was greatly damaged. Nonetheless, the Germans kept a few guns on the forward edge in case of need.

It seemed impossible to attain surprise. Nevertheless, early in the morning on the day of attack, an armored train appeared under the very nose of the enemy. With artillery fire from a distance of about one kilometer it destroyed several important enemy gun and firing positions. Before the Germans could recover, the armored train disappeared. By this bold maneuver the train considerably facilitated the infantry's capture of hostile positions. The gunners and the machine gunners knew well the targets in their sector of fire, which permitted the achievement of a high degree of accuracy of fire and its rapid concentration on the most dangerous targets. Success of the armored-train attack was assured also by the fact that before the attack, in the course of several dark nights, a large party of railway troops secretly repaired the track for a distance of three kilometers, running it almost up to the hostile defense.

As is evident from the preceding example, actions of the armored train should be preceded by skilful reconnaissance of targets, as well as by most painstaking preparation for the attack. Fire of the armored train must be directed from the beginning at the nearest artillery targets. This alone permitted the armored train to depart unharmed behind the nearest hill after finishing the shelling of the enemy position.

Usually it is not advisable to make several consecutive armored-train attacks on one and the same

sector of the terrain. The enemy, adjusting his fire, easily knocks out the train. But in combat practice there are cases when a group of armored trains executed attacks for a long while, putting out of action one German firing position after another in the very same sector. Safety of action of the armored train was secured in these cases through organization of points for continuous observation near the forward edge of hostile defense and through the maintenance of close contact with infantry reconnaissance, always noting the least changes in the German defense system.

Guns prepared by the Germans especially for fighting armored trains were annihilated suddenly by the concentrated fire of our artillery either before or during the armored-train attack. For this purpose point-blank fire of individual regimental and divisional guns is widely employed. To the lot of the armored train usually falls the crushing of numerous enemy machine-gun and mortar nests. True, the Germans tried to fire on the railway tracks from hidden positions; but our batteries, especially assigned for the purpose, awaited this moment in order to come down with their fire on the hostile artillery.

These and other examples of successful action of armored trains in varied tactical situations affirm that by skilful use in general combat they can support attacking units with sufficient effect. Success of action by armored trains will be greater, the more accurately their cooperation is organized with artillery, infantry, and aviation. Results of armored-train attacks increase if armored-train units systematically conduct reconnaissance themselves and set up their own observation posts in the terrain, maintaining communication with those of the artillery.

Night Combat

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from an article in *Krasnaya Zvezda* 1 August 1943.]

NIGHT has always been the true ally of bold and skilful warriors. In conditions of the present war the role of night operations has grown especially. The fire power of the defense and the abundance of varied combat matériel now limit the success of day combat. On one sector of the front, fighting for a tactically important hill went on more than a week. The scales tipped first in one direction, then in the other. But when our units made sufficient preparations and accomplished a bold maneuver at night, the problem was solved. All experience of war proves that night favors actions of well organized troops led by brave, resourceful commanders. Darkness helps to achieve the element of surprise, reduces losses from the enemy's fire, and weakens his resistance. It is the duty of our troops to use fully the

benefits of night for inflicting rapid and powerful blows on the enemy.

Night actions involve a number of serious difficulties. The least mistake by the commander organizing night combat or the least negligence by the troops will produce disastrous consequences. The most careful, foresighted preparation is necessary. Success in night combat is impossible without exemplary arrangements and impeccable accuracy of action on the part of all links of the army organization down to the last.

Experience of war emphasizes that at night complicated maneuvers should not be indulged in, however alluring they may appear at first glance. Our regulations demand that the plan of night attack be simple in design, that troops receive limited tasks, and that routes of attack be straight and short. Chance, accompanying to some degree all combat actions, is a most frequent guest in night operations. Besides that, darkness naturally makes troop command difficult during combat. This necessitates the most minute and detailed development of the plan of night actions. In each separate case, when deciding on night fighting, the commander must evaluate the situation in every way, weigh all its elements, and provide ahead of time for several possible variations in the development of events.

Of course the success of night action is largely determined by how reconnaissance works—how well known is the enemy's system of defense, his strength, and the condition of the terrain. But some of our commanders consider only one side of this question, conducting all the activity of reconnaissance solely for getting information concerning the enemy. Undoubtedly this is one of the most important factors of combat security, but to limit it only to this would be incorrect and unfortunate. It is necessary to study not less thoroughly the starting lines of attack, and to mark routes of movement with designating signs. In a certain unit the commanders, going out on reconnaissance, took along guides. During reconnaissance the guides carefully studied approaches to the hostile defense and set up beacons, and at night they faultlessly led their units to indicated places. It must be a rule that, before every night battle, orienting points in the terrain are marked, azimuths determined, and directions indicated by the moon and stars. All resources, all means must be used to secure rapidity of maneuver, concealment of movement, and correct departure. This is a good half of combat success at night.

It is well known that in defense the Germans make wide use of all possible obstacles; and at night even the smallest obstacle can become a serious obstruction which not only lowers the tempo of the movement, leading to excessive losses, but also reveals the attack before it reaches the forward edge of hostile defense. This means that it is essential to clear the way for the attack beforehand. It is impossible, of

course, and also unnecessary to aim at complete clearing on the whole extent of the zone of attack. For the first stage of battle it is enough to disclose exactly where mine-fields and wire entanglements are located and to mark them with precision. Not only the commander but also every soldier must be sure to know the location of cleared passages and the methods of overcoming the obstacles still remaining.

In night battle infantry has the main role. But this in no way lessens the roles of other kinds of troops. At night, as in daytime, it is necessary to strike the enemy not with spread fingers but with a firmly clenched fist, gaining victory with combined forces of all types of weapons. Anything but really exemplary cooperation is out of the question. Artillery and mortars must be prepared ahead of time for barrage fire in front of the attackers as well as for striking the most important objectives. Our tanks can also do much at night. It is necessary not to be alarmed at the difficulties of employing tanks in night combat, not to exaggerate these difficulties but to surmount them skilfully, carefully preparing each tank attack. In the dark, tank personnel, like infantry, must not indulge in complex maneuvers but must use their vehicles for short blows, moving within the combat formations of the infantry.

All this also applies in full to the actions of aircraft. Their active support can and must play a large role in the outcome of every night battle. It happens, however, that some general officers in planning night actions either leave aviation out of consideration altogether or assign to it extremely general and hazy tasks. No wonder that in such cases our fliers do not find objectives for bombing and at times do not drop the bomb load where the situation demands. In the course of the war there have come to light several tried methods of designating directions for aircraft and of indicating targets and positions where friendly troops are located. It is necessary to use all these methods fully. Infantry commanders must be required to fulfil most thoroughly all rules of cooperation with aviation on the battlefield. At night, as by day, not a single fruitless flight, not a single bomb off the target—such results cannot be achieved without the help of infantry commanders.

Night fighting also makes increased demands on the soldier's moral qualities. Solidarity of units, self-control of soldiers and commanders, their ability to act decisively and enterprisingly in any situation—these are among the basic factors of success. "The advantage in night fighting," writes Dragomirov, "is that it is not apparent who is stronger, and he who is bolder and does not fear death wins out." When every soldier is thoroughly conscious of this and when masterful command of night combat is firmly combined with courageous, decisive action by every last soldier and commander, nothing can block the road to success.

Prepare every night battle with thorough thought

and care and do not disregard even a single trifle. Do not give the Germans a minute's rest; in darkness as in daylight, stubbornly and resolutely destroy the enemy!

German Tank Grenadiers in Action

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a German article by 1st Lieutenant Schaefer, German Army, in *Die Panzertruppe* June 1943.]

ON A broad front a tank battalion goes rattling on its way eastward under the burning sun. Close behind follows a tank grenadier company.

In each of the grenadier company's armored infantry vehicles there are two men who are ceaselessly on the watch. The antiaircraft gunner stands at the rear machine gun with the circular front sight in place for use against aircraft and ammunition ready at hand. Red fliers may come from any direction, and it is his task to fire quickly and cause the planes to turn aside without using bombs or weapons on the column of vehicles. Up in front, beside the other machine gun, stands the group com-



mander. Now and then he raises his field glasses to his eyes and searches the terrain. He is responsible for giving his group the first view of the enemy. Beside him the glistening snake-like form of the cartridge belt passes into the machine gun. Ammunition is arranged on a 1:3 ratio today: i.e., every third one is a tracer bullet. For a long time now, old gunners have not made use of sights in fighting from a vehicle. They guide their fire to the target by means of tracer ammunition.

The task today is to make an energetic drive through the partially surrounded enemy, cut his forces into several parts, and then annihilate these parts separately.

The gaze of the company commander sweeps

proudly over his company. His platoons are following him in a formation of great width and depth. Intervals between tanks amount to at least fifty meters. Radio apparatus is set for reception, for we are not yet permitted to send messages as we do not wish to draw the enemy's attention.

Through the glistening haze a village shows up ahead of the leading tanks. According to the map, it should be Krutoyarka. Suddenly we are fired on from the edge of the village. We have brought the enemy to bay. Our tank cannon and the enemy's antitank cannon roar loudly, and in between them is heard the slow rattle of the Russian machine guns and the rapid rattle of the German. There is no need for a combat order by the company commander of the tank grenadiers. The combat situation is perfectly clear. The men look cautiously over the edges of the armored cars. They know what to do. Tank grenadiers do not have to be given many orders. They catch sight of the enemy and go after him as the situation requires, either in the armored cars or after rapidly dismounting.

The leading tanks break into Krutoyarka—and at once come out again. There must be something wrong! Immediately there is a radio order for the commander of the tank grenadier company: "Krutoyarka occupied by the enemy. Clean out the town!"

At a rapid pace the armored troop vehicles push ahead towards the edge of the village through the tank formation, which is giving the enemy everything of which its guns are capable. One of our vehicles gets a direct hit in its tracks by an antitank shell, and the crew immediately leaps out and puts the flanking antitank cannon out of commission with their machine gun while the driver and his helper change the damaged track under the enemy's fire. Now the tank grenadiers are at the edge of the village. In a flash they are out of their vehicles, into the Bolshevik trenches, and onto the necks of their occupants—and the edge of the village is in our hands! The empty vehicles dash around to the side of the village and the assistant drivers open fire on the enemy's flank with the vehicles' cannon and machine guns. The roofs are quickly set on fire and acrid smoke descends between friend and enemy, shutting off all view. Three tanks dash forward on the village street; the fight has begun in the village. With hand grenades, pistols, and bayonets, tank grenadiers bring the Reds out of their holes and bunkers. The smoke is a great friend to us; the Bolsheviks cannot recognize how small our numbers are. Fortunately, on account of the smoke, the Bolsheviks are not able to make full use of their numerous machine guns; and all fighting is decided at close range. Unified command of the company is scarcely possible any longer. Under officers and noncommissioned officers small assault detachments have been formed which dash forward from house corner to house corner, from bunker to trench, mopping up nest after nest

of the enemy. The company commander discovers a Russian 3.7-cm automatic antiaircraft cannon ready for action and climbs into the seat. His two messengers attach the magazines and although the commander has never fired such a gun before it blazes away bravely when he presses the trigger, planting its explosive shells in the midst of the Reds.

When half of the village is in the hands of the tank grenadiers, resistance grows weak. It is high time, too, for our hand grenades and pistol ammunition are at an end. Part of the tank grenadiers have already seized Bolshevik machine pistols and Nagant revolvers and have gone on fighting with them.

The fight for the village, which was almost one and a half kilometers long, lasted two hours. Then it was mopped up. When the tank grenadiers arrived at the other end of the village and were finally able to breathe fresh air again, the tanks, which during the fight had gone around the village, continued on their way to the east. The armored personnel carriers moved in behind; and the tank grenadiers mounted them, following the tanks to a new engagement.

The Light Antitank Gun

[Digest of an article by Lieutenant R. D. Boyd in *An Cosantóir* (Eire) July 1943.]

JUST as the tank appeared as a counter-check to the machine gun, so in turn a variety of weapons have been developed to counter the tank. Of these, one of the chief is the light antitank gun with a caliber of from 37-mm to 57-mm.

This gun, with its flat trajectory and wide traverse, is able to switch and adjust its fire quickly when engaging a moving target. Its effective range rarely exceeds 1,200 yards. Its power to penetrate armor naturally increases with shorter ranges, and in combat fire is withheld until the last possible moment. Fire is seldom opened at ranges greater than 800 yards; thus the telescopic sight of the German 37-mm gun is graduated from 300 to 900 meters, that is, from 327 to 981 yards. The shell penetrates two to three inches of armor at ranges from 500 to 1,000 yards, according to caliber. Penetration is affected by the angle of impact, and varies in direct ratio to it. The angle of impact varies according to the part of the tank which is struck and according to the nature of the terrain. The reader will appreciate that a 45° angle of impact on the level may become a 75° angle for a tank going downhill. The surfaces of a tank crossing rough ground present constantly varying angles of impact to the defender's fire. Failure to knock out a tank with the first hit, therefore, does not necessarily mean that the tank is proof against the defender's fire. Guns sited in flanking positions have the advantage of a line of fire against the lightly armored sides of hostile tanks, as against their heavy frontal armor. They have also a good chance of effecting surprise, as tank

crews have very restricted observation to the flanks. Guns sited on reverse slopes may fire with good effect against the vulnerable under-bellies of tanks appearing on the crest.

Although the armor-piercing shell is the standard ammunition, a proportion of high explosive ammunition is usually carried.

The rate of fire of the gun varies, in general, from 15 to 25 aimed rounds per minute.

The gun has a low silhouette. Presenting a small target, it is inconspicuous and easy to camouflage. A light shield gives the crew some protection against small-arms fire. It is mounted on a carriage with two pneumatic tired wheels and a split trail. When on the march, the trails are closed and linked to the rear of a truck in which the crew and ammunition are carried.

Antitank guns now appear in nearly every type of formation. The standard antitank gun of the German Army was of 37-mm caliber until the spring of 1941, when a 50-mm gun was introduced; it may be assumed that this gun is replacing the 37-mm. The German Army also uses the 47-mm Skoda. In the German armored division these guns are found in the antitank battalion, which has 36 of them, and again in the reconnaissance unit of the division, and in the battalions of its lorried infantry regiment. In the German infantry division there is an antitank battalion with 36 guns, and in each of the division's three infantry regiments there is an antitank company with 12 guns. These guns are found also in the reconnaissance squadron of the division.

Here we shall deal with the antitank gun as used in close cooperation with infantry. For this reason we shall confine our attention to the antitank company of the infantry regiment. The company is completely motorized. Before the present war the German antitank company* was organized as follows:

	Rifle Companies	Machine- gun Companies
1st Bn	No. 1, No. 2, No. 3	No. 4
2d Bn	No. 5, No. 6, No. 7	No. 8
3d Bn	No. 9, No. 10, No. 11	No. 12
No. 13 (infantry howitzer) company with 6 75-mm howitzers and 2 150-mm howitzers. No. 14 (antitank) company.		

A Company, consisting of

A Headquarters troop and

Four Platoons, each platoon having three guns. This organization is reported to have been used in France in 1940. On the other hand, a company of three platoons, each platoon with four guns, was reported in the Polish campaign of 1939. An account of German infantry organization which appeared in July 1942 gives the organization as:

A Company consisting of

A Signals Platoon, and

Three Antitank Platoons, each platoon having four guns. We may therefore take the present organization of the company as being on a three-platoon basis.

The individual training of the German antitank gunner includes the use of the hand-grenade, pistol, rifle, and light machine gun. The gun commander and No. 1 (who aims and fires) and No. 2 (loader) carry pistols. Nos. 3 and 4 (who carry ammunition) have rifles. We may assume that grenades are also carried. We do not know where or in what numbers the machine gun appears in the company organization but the inclusion of at least one machine gun in each platoon would seem a likely arrangement. The machine gunners would have the task of protecting the platoons against enemy infantry trying to clear a path for their own tanks by knocking out the gun crews. They would also give some defense against low level attack by aviation.

The pre-war organization of the company provided each gun crew with two armored trucks. One truck carried crew and ammunition, and towed the gun; the other truck carried ammunition and towed an ammunition trailer. If this establishment still holds, it would give the sub-units of the German company considerable freedom of action. Being less dependent on supplies from the higher unit, they would be better able to carry on the fight if cut off from adjacent and supporting troops. This is important in combat against tanks, in which attacks may develop from several directions in a matter of minutes.

The tactical employment of the antitank gun is such a large subject that we have space here to refer only briefly to a few general principles.

We have seen that each gun is truck towed. The truck does not tow the gun into the firing position, as its bulk would reveal the position to enemy observation. Instead, the gun is unlimbered under cover and is manhandled into position by the crew. The unlimbering position must be as close as possible to the fire position, as the manhandled gun has very low cross-country mobility.

On account of its flat trajectory and relatively short range, the gun must fire from an open position. Most light antitank guns have both telescopic and open sights for direct fire, which is the only effective fire against tanks. At present there is a general tendency towards an increased use of direct position by field artillery. Once fire has been opened, the gun is exposed to enemy observation and fire. For this reason the gun, when in action, cannot stay long in one position. The crew must be prepared to move it quickly, again by a covered approach, to alternative fire positions selected and prepared beforehand.

In antitank work guns are generally sited in pairs, for mutual support, so that each gun in turn can cover the movements of the other. Guns may fire

*The antitank company is the 14th company of the German infantry regiment. The companies of the regiment are numbered consecutively as follows:

singly in operations which do not involve antitank defense, such as in attacks on positions or emplacements or in street fighting.

From the tactics of the individual gun we pass to the tactics of the company and its platoon. With a three-platoon company, the German regimental commander is able to attach a platoon to each of his three infantry battalions. As the battalion includes three rifle companies, it is possible to carry the distribution of guns still further by attaching one gun to each company.

Normally, however, guns would not be attached to units lower than a battalion, except to a company with a specific antitank mission or acting as an advance guard, in which case a platoon would probably be attached.

It has to be remembered that the German infantry regiment may be reinforced by an additional antitank company from the divisional antitank battalion, which consists of a signals platoon, three antitank companies and an antiaircraft company.

In the approach march the disposition of the company is governed by the terrain and the disposition of the other units of the regiment. The ground is reconnoitered and areas which offer approaches to hostile tanks are noted. Sites suitable as gun positions are sought. The bulk of the company will be concentrated in any direction which seems especially vulnerable to attack. No standard disposition of the company can be laid down. As regards German practice we are able to cite two actual cases. In the Polish campaign the 12th Infantry Regiment made an approach march in the following order:

RIGHT (MAIN) COLUMN:

- Horsed Reconnaissance Unit.
- Infantry detachment.
- No. 1 (Rifle) Company.
- 1 light howitzer Platoon (2 75-mm howitzers).
- 1 Antitank Platoon.
- 1st Battalion (less No. 1 [Rifle] Company).
- 1 heavy howitzer Platoon (2 150-mm howitzers).
- 1 Field Artillery Battalion, attached from Division (less 1 battery).
- 1 Antitank Platoon.
- No. 5 (Rifle) Company.
- Regimental Staff and regimental Signals Platoon.
- No. 6 (Rifle) Company.
- No. 8 (machine gun) Company.
- No. 13 (Infantry Howitzer) Company (less 2 light and 1 heavy Platoons).
- No. 14 (Antitank) Company HQ.
- No. 7 (Rifle) Company.
- 2d Battalion (less No. 7 [Rifle] Company).

LEFT COLUMN:

- 3d Battalion.
- 1 Light howitzer Platoon (2 75-mm howitzers).
- 1 Antitank Platoon.
- 1 Field Artillery Battery.

Our second example of a German approach march concerns the 28th Infantry Regiment, and here we have information only of the battalions and the antitank company, which consisted of four platoons. During the campaign in Belgium in 1940 this regiment made a march in the following order:

RIGHT (MAIN) COLUMN:

- 2d Battalion.
- 1 Antitank Platoon.
- Regimental H.Q.
- 2 Antitank Platoons.
- 3d Battalion.
- 1 Antitank Platoon.

LEFT COLUMN:

- 1st Battalion.

In the attack, the disposition of the company is determined by the terrain, the enemy situation, and the regimental commander's plan.

The platoons may be attached to the battalions when the attack is to be made on a wide front, or when the terrain is of a generally uniform character, so that no one sector of the front offers better obstacles or better approaches to tanks as compared with other sectors. The platoons may also be distributed among the battalions when the terrain or the weather restricts visibility to short ranges. But these are special cases. In general it is thought best to concentrate the platoons as much as possible.

In the attack the company is given supporting and protective missions. One or more of its platoons give close support to the assault echelon, moving forward with it as it advances. Here their action will not always be limited to antitank fire. Using either armor piercing or high explosive ammunition, the guns are able to attack pill boxes, machine-gun positions, transport, and personnel. The remainder of the company usually stays in rear with the regimental reserve, protecting it from flank attack and enabling the company to develop fire in depth should enemy tanks break through the assault echelon. When the enemy's defenses have been broken, the company is held in readiness against possible counterattacks. When the enemy is in retreat, antitank guns will often be attached to pursuit forces.

We now turn to the company in the defense. With tanks, an attacking force has great power of maneuver. In a few minutes it may be able to develop concentric attacks from several directions. The tank attack is rarely limited to a frontal onslaught.

Hence, in antitank defense, the ground to be defended is organized as an area against which tanks may advance from any direction. The older defense systems were based on a frontal "main line of resistance," organized to meet attack from only one general direction. Linear defense went out in 1917 with the advent of infiltration tactics. Mobile armor

rendered the purely frontal defense obsolete, and it is now found only in special cases, as for example, where a river can be used as an antitank barrier.

When possible, the guns are placed in positions where the terrain is difficult for tanks, but from which there are good fields of fire on likely tank approaches. The platoons should work in close mutual support with adjacent infantry units, the platoons giving antitank protection to the regiment as a whole, while the other units of the regiment in turn defend the platoons against enemy infantry and aviation. The guns are thus coordinated with other infantry weapons to form a closely woven pattern of defensive fire. Tank mobility necessitates the defense being provided with a carefully organized system of observation posts and warning signals.

In general it is thought best to keep the platoons within as small an area as possible. To achieve this, certain approaches may have to be defended by obstacles, demolitions, and mines, and covered by infantry fire. A policy of dispersing guns to cover every conceivable avenue of tank approach results in the defense being nowhere really strong. If on the other hand the guns are disposed fairly centrally and in depth, fire can be quickly concentrated in any direction from which tanks threaten to break through. A Russian officer writes: "The antitank defense center and the antitank area become the basis of antitank defense."

Fire in depth is essential. Tanks usually attack in mass on a narrow front. A single platoon may knock out several tanks but it cannot hope to stop an assault by large numbers of tanks advancing at anything from 15 to 35 miles per hour. The platoon position will be overrun, but if the tanks have still to face further platoons which have been disposed in depth, then the defenders may still break the attack.

Mobile Obstacle-Building Reserves

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Russian article by Lieutenant Colonel F. Lvov, Soviet Army, in *Krasnaya Zvezda* 4 June 1943.]

ENGINEER OBSTACLES, especially mines, are widely used in all types of combat. If in former wars it was enough to have one kind of obstacle arranged in a straight line, now, when varied matériel and especially tanks are involved in battle in great quantities, obstacles laid on a straight line are easily overcome and cannot serve as dependable protection for the troops against hostile attack. In order always to have antitank defense, and in attack to consolidate a position quickly and cover the flanks of the attacking unit, it is necessary to prepare engineer obstacles in good time and in great depth. It is necessary to note that obstacles are most effective in those

cases where their system is integrated with the fire system of antitank artillery and antitank riflemen and is covered by the fire of infantry units.

Contemporary combat is a battle of movement, for tank and motorized units can move with great speed over considerable distances. This means that it is impossible to rely solely on a previously erected system of obstacles. Obstacles must be maneuverable, and it is necessary to be able to erect them quickly in places of probable hostile attack or counterattack. This is accomplished by the constant presence of a mobile engineer obstacle-building reserve. The practice of using mobile engineer obstacle-building reserves has proved its worth in fighting at the approaches to Leningrad, Stalingrad, and on other sectors of the front. Whenever these obstacles (minefields) were installed in sufficient density, the enemy suffered great losses.

Basically, this mobile obstacle-building reserve is a group of sappers familiar with mines and explosives, and supplied with this type of equipment and also with automotive transport. They must be able to set up the obstacles quickly. The composition of such reserve groups is varied, beginning with sapper squads and ending with engineer units. A combined force of all arms, as a rule, will have attached to it one or several platoons detailed from large engineer units. Sometimes, according to the situation, it is necessary to have tommy gunners and other units accompany the sappers for reinforcement and protection.

In 1942 a considerable force of the enemy succeeded in breaking through two antitank positions of a certain sector, forcing our units to retreat somewhat. The situation demanded the quick erection of mine obstacles in the narrow zone of the enemy breakthrough in order to block his advance, to give time for our reserves to move up to the place of breakthrough, and to deploy for the counterattack. Engineer units of the obstacle-building reserve accomplished this task.

The commander of engineer troops of a certain force of combined arms assigned to each unit of the mobile obstacle-building reserves a zone four to six kilometers wide along the front, and ordered the bridges and roads to be mined, leaving passages for friendly troops, while also reinforcing several natural obstacles with mines.

The commander of the engineer unit, having received the order, assigned missions to his lower units. He informed the men as to the situation, pointed out to each lower unit the immediate objective and the next one, and, for the eventuality of withdrawal, he indicated the general distribution of obstacles. It was also indicated where and how the mines were to be obtained and when the first lines of obstacles had to be ready. For communication with the commander of the force of combined arms the engineer unit commander sent a staff officer, while

he himself proceeded to the first objective with one of the lower units.

The work of the engineers was organized in relays from the advanced units to the defensive rear.

The task of each unit was to mine the bridges and possible detours and to lay minefields in those directions whence enemy tanks might appear. The commander of the engineer unit, being present on the line where the work was to start, assigned the tasks by platoons, and the latter proceeded to their sectors where the platoon commander detailed groups of sappers to their respective objectives, and the work began. The first line was reinforced with mine and explosive obstacles three hours after the order was received, the second line after four hours, the third after six hours. These three lines formed a zone of obstacles 8 to 10 kilometers in depth. Reconnaissance was carried on simultaneously with the work.

What were the results of this work when the enemy launched an attack in this place? On the first line (a stream), at a small bridge destroyed by a group of sappers, the leading hostile tank was blown up by a mine. Three other tanks, fired on by our artillery, turned back. The enemy did not appear here again during the day, while on the following day he was thrown back by our counterattack and his offensive was finally stopped. All the obstacle-building elements were at once shifted to the outer edge of our defense. It must be noted that the units of the engineer obstacle-building reserve accomplishing this defensive work were completely equipped with automotive transport for the movement of personnel and mines in the proportion of ten mines to one sapper. They were supplied with obstacle equipment from the army depot, moving it by means of their own transport.

The most important part of the work of mobile obstacle-building detachments is to determine promptly the probable direction of an enemy attack or counterattack in order to direct the mobile obstacle-building reserve to the proper place. Lines along which obstacles may have to be laid are marked out ahead of time, small streams and irregularities in the terrain being designated for the purpose. The supply of obstacles is made quickly available by concentrating them in various field depots. The successive lines of defense which may come under enemy attack are constantly reconnoitered in order that they may be quickly reinforced by obstacles when necessary. Communications are constantly maintained with the commanding officer of all forces in the area in order to be prepared for any movements that are anticipated. The obstacle-building reserves must be located along the principal routes so that they can be shifted quickly to the points where they are needed. They should be in a position to accomplish any assigned mission in as little time as possible; one to two hours should be enough for a lower-unit reserve, two to four hours for an army reserve.

Lower unit mobile obstacle-building groups, as a rule, must operate within the general antitank reserve. However, the possibility is not excluded of using these groups independently for blowing up bridges, mining stream fords, etc., in those cases when the retreating rearguard does not have the means for performing this work. The obstacle-building reserve often may be required for mining various roads leading to a strongpoint, to command posts, and to certain firing points and positions.

Tanks In Attack

[Translated at the Command and General Staff School, Fort Leavenworth, Kansas, from a Russian article in *Krasnaya Zvezda* 13 August 1943.]

SUCCESS of attack is assured primarily through close cooperation by all types of troops. Working hand in hand, each of the arms and services must be used according to the demands of the developing situation. At the present stage, especially in the Kharkov sector, activities of tank units play an important role. Skilful use of tank and mechanized units, moving in the advance guard of ground troops and inflicting deep blows on the enemy, now assumes decisive importance.

Tank units have great striking power and mobility. They can operate at some distance from the main mass of infantry and artillery engaged in attack along the front line. In some cases it is difficult to avoid space between the tanks and the main body of forces, but tank units used for development of a breakthrough must not be permitted to lose operative contact with the main mass of attacking troops. More than that, under present conditions the interval between them must not be allowed to continue for a prolonged time when tank units find themselves forced to engage in individual combat. However strong the mobile tank and mechanized units, they themselves are not able to execute all tasks of an attack operation. By decisive action, tanks can create favorable conditions for destruction of the enemy; but this destruction is attained by the combined efforts of all types of troops and all means of attack concentrated in the decisive direction. Troops must unwaveringly move behind tank units, increasing their impact and consolidating their success.

All this permits tanks to make full use of their mobility for delivering fast, deep blows against the enemy. Whatever sort of break there may be in operative contact between tank units and other troops, lack of coordination in their actions is inescapably expressed in slowing down the tempo of general attack. Tank wedges striking into the enemy disposition have crushing force only when they are backed up by infantry-artillery masses. This does not mean, of course, that tank units must stall around waiting for the infantry to come up. Tank blows must be energetic but also in consonance with the

movement of the other engaged forces. Tank units cannot turn back to take up broken contact with other troops. This contact is maintained only by incessant, energetic advance of infantry and artillery behind the tanks. Equal advance with tank units penetrating the disposition of the enemy—that is the iron law of attack, the law of victory.

Tank and mechanized units fighting in rear of hostile positions are in need of air support. For this purpose, means must not be spared. Massed tank and air forces in decisive directions—that is another fundamental principle of attack. Without mastery in the air over the battlefield, it is difficult to win tank mastery on the ground. This means that tank operation must be combined with powerful air attack estimated to cover the full depth of enemy positions.

What is demanded of aviation engaged in support of tanks developing the success of an attack? First of all, well coordinated blows on obstacles encountered in the path of the tanks. In some cases there will be previously prepared strongpoints; in others, antitank reserves brought up by the enemy against our tanks. Both strongpoints and enemy reserves must be subjected to powerful action from the air and then attacked by the tanks, or by-passed by them if this is expedient. Everywhere where tanks need air support it must appear at once and inflict precise blows on indicated targets. This demands flawlessly organized communications between tanks and air units and their commands. The order calling out aviation, directing it, and designating the position of tanks in the terrain, all this to the least detail must be worked out in advance and known both to fliers and tank personnel. Besides that, experienced air officers must accompany commanders of tank units to maintain radio communications with their units and to direct the planes while the latter are in flight.

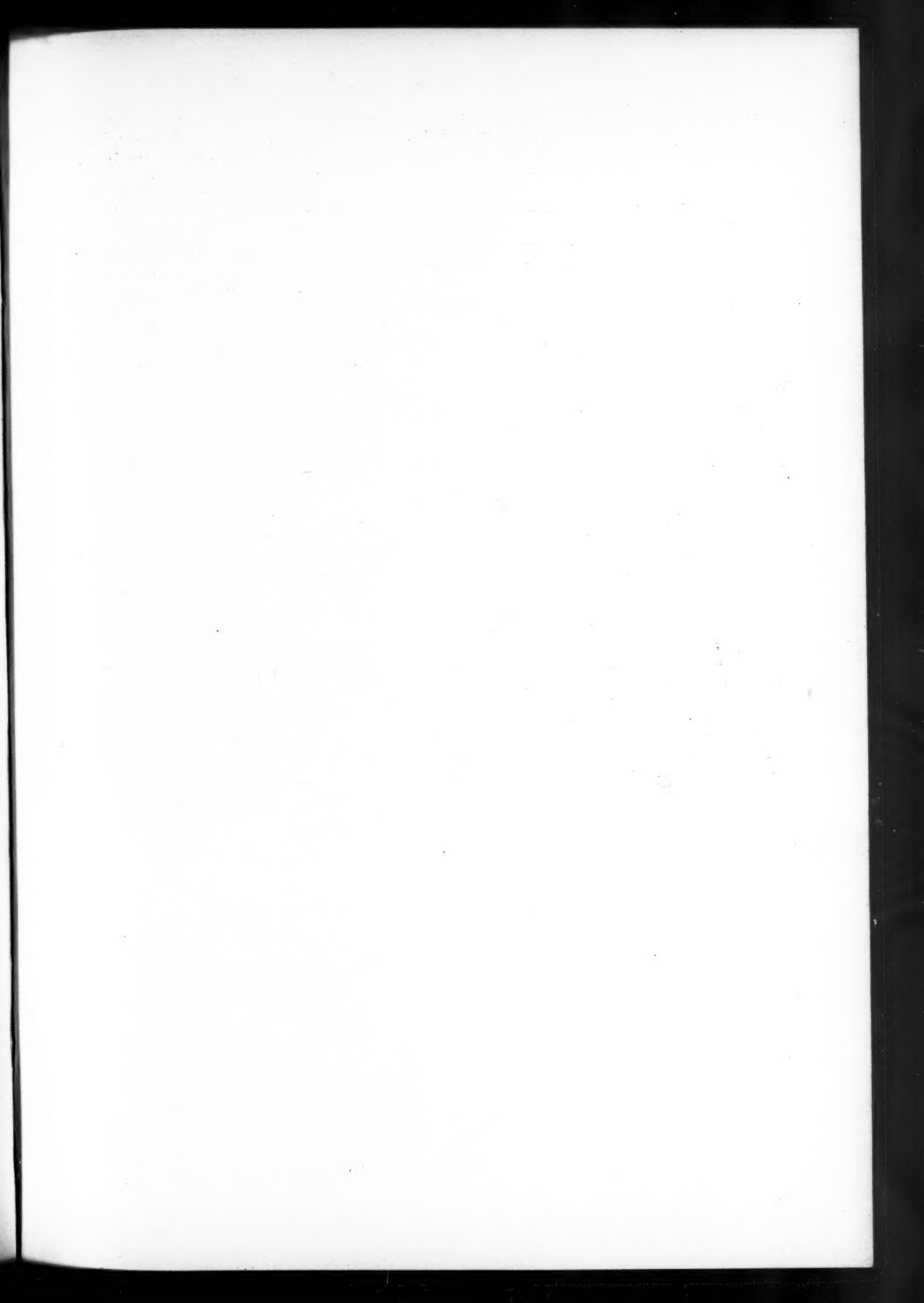
Actions of tank and mechanized units must be dis-

tinguished by high maneuverability, speed, and boldness combined with precise calculation. Without special need prolonged battles must not be engaged in on fortified enemy lines. The basic method of operation of mobile troops is outflanking and flank blows, to which the enemy is more sensitive than to frontal blows.

The fight for lines of communications in every large battle takes on great significance. Boldly maneuvering tank units must seize railroads and highways, cutting off enemy routes of retreat. In fighting for populated places which cannot be seized at first blow, tank units are used primarily for surrounding and blocking off hostile garrisons, thus preparing for their final liquidation.

Moving forward, tank and mechanized units must always be ready to encounter large forces of hostile tanks. Well-organized ground and air reconnaissance excludes surprise in such meetings and gives the opportunity to take up battle under favorable conditions. It is essential to oppose enemy tanks with all the fire power of organic and attached artillery, to call out strong groups of bombers, and with their support to execute further maneuver. Elements of units of all arms must promptly hasten to the place where tanks are engaged and simultaneously with the tanks inflict their blows on the hostile concentration, thus insuring continued action of the tanks.

Tank and mechanized units are powerful elements for developing a breakthrough. They permit execution of the attack at high tempo, striving to crush hostile defense in great depth. It is important only that their maneuver be strictly coordinated with the activities of other types of troops, and that cooperation between them be faultless in the course of the whole operation. This is the most important condition of the success of the attack.





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